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AN ECONOMIC STUDY OF SOME PROBLEMS OF WESTERN ILLINOIS APPLE GROWERS

By
H. W. Mumford, Jr.
and
S. W. Decker

★ ★ ★

In Cooperation with
Illinois Agricultural Experiment Station

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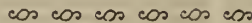
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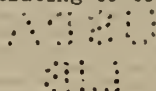
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AN ECONOMIC STUDY OF SOME PROBLEMS OF
WESTERN ILLINOIS APPLE GROWERS 1/

By

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1/ This study was undertaken in June, 1936, jointly by the Cooperative Division, Farm Credit Administration, and the Department of Agricultural Economics, University of Illinois. Appreciation is due to H. C. Hensley of the Cooperative Division, Farm Credit Administration, and Dr. J. W. Lloyd and Dr. L. J. Norton of the University of Illinois, for advice and assistance in the conduct of the study. Collection of data in the field was facilitated by the excellent cooperation of the farm advisers in each of the seven counties concerned, the Division of Markets and the Division of Agricultural Statistics of the Illinois Department of Agriculture, and the several hundred growers, cold-storage operators, commission men, and others who gave time and data freely. The field sheets of the Soil Conservation Service of the Agricultural Adjustment Administration were used in the location of orchardists and in the determination of the orchard acreage for each grower.

Illinois apple growers have had increasing difficulty in producing and marketing their apples at a profit. Heavy plantings have resulted in rather steadily increasing production in the area. The concentration of the apple orchards has meant an increased development of disease and insect pests. Reduced consumer purchasing power during the economic depression and competitive advertising by producers of other fruits cut seriously into consumption of apples and reduced the market prices therefor 2/. Local sources of production credit were practically exhausted. The climax came with the bumper crop of 1935, both in the western Illinois area and in the entire country. Markets were demoralized because of unusually large holdings in storage and because adverse weather conditions restricted operations in the normal period for movement of apples out of storage.

In March 1936, meetings of growers, farm advisers and others were called by the Illinois Agricultural Association to discuss the problems of apple growers in western Illinois. As a result of these meetings, the Cooperative Division of the Farm Credit Administration was requested to conduct a survey of the area and make recommendations to those concerned.

METHOD AND SCOPE OF STUDY

The principal objectives of the study were:

1. To record the experiences of apple growers in financing and marketing cooperatively, and obtain an expression of their attitudes toward the development of cooperative financing, packing, and marketing organizations.
2. To appraise the strength and weaknesses of current apple-production, financing, and marketing practices in relation to the possibilities and limitations of cooperative marketing, financing, and packing.
3. To determine the location, capacity, equipment, and ownership of apple-packing houses in the production area, and of apple storages located in the market area.

2/ "About 19,000,000 bushels of the Central States apples were apparently sold for fresh consumption annually from 1921 to 1925, but in the five years ending in 1935, fresh apple sales decreased to about 16,000,000 bushels annually." ... "Prices received by apple growers in the Central States declined very considerably after 1930, reaching a low point in the 1931-32 season, when they were approximately 50 percent of the 1924-1929 average." Todd, C. I. Marketing Problems in the Apple Industry, The Central Situation, U.S. Department of Agriculture, Agricultural Adjustment Administration, General Crops Section.

4. To discover the need, location, equipment, and capacities of packing houses required for economical packing of apples in the area and the need for additional byproduct plants.

5. To ascertain the amount and source of production credit extended to apple producers, by credit, supply and marketing agencies, and the influence of such credit upon the storage and marketing of apples.

6. To make available to apple growers, financing agencies and others, the results of the study as a guide toward improvement of any unsatisfactory financing, packing and marketing conditions.

The counties selected for study were the seven represented at the Jerseyville conference, namely: Adams, Brown, Calhoun, Greene, Jersey, Pike, and Scott (fig. 1). These counties lie in the important producing belt for late apple varieties in Illinois. Within this area, information was obtained from apple growers, dealers, and others handling apples or making apple byproducts. Data were obtained also from distributors, cold-storage operators and commercial users of apples in several large markets to which Illinois apples move.

Attention was given primarily to operations in connection with the 1935 apple crop. Figures necessarily are based upon estimates of those interviewed since not all dealers and very few farmers kept adequate records from which the desired information could be drawn.

Data were obtained through personal interviews, recorded on questionnaire forms and, in a few instances, through correspondence. Apple growers interviewed were selected so as to give representation both to orchards of various sizes from a minimum of 4 acres up, and to orchards located in all parts of the area studied.

Growers interviewed numbered 177 in Calhoun County, 45 in Jersey County, 38 in Pike County, 27 in Adams County, 18 in Greene County, 5 in Scott County, and 3 in Brown County. Information was also obtained from 21 commission men, brokers and other marketing agencies, from 14 concerns making cider, vinegar, pies and other apple products, from 19 operators of cold-storage houses, from 31 trucker-dealers, several business men and bankers, the Illinois Fruit Growers' Exchange, the Adams County Shippers Association, the Calhoun County Farm Bureau Exchange, and from the farm advisers of the several counties.

STABILITY OF THE ORCHARD INDUSTRY

The stability of the orchard industry should be considered before projecting any long-time plans to improve the production and marketing of apples. The results of the grower survey show that over 90 percent of the orchards in the area were operated by the owner or by some member of the family (table 1). This indicates that tenancy among orchardists was relatively small as compared with tenancy among all classes of farmers in the area, which was over 40 percent. ^{3/}

Fifteen percent of the orchardists interviewed reported having been in the orchard business all their lives; the average for the remainder was 22 years (table 1). Thus, the producers are experienced and may be expected to have a good knowledge of production problems. Furthermore, the average orchardist had been 18 years on the farm he was then operating, so that he had become familiar with the peculiarities of the orchard which he operated.

The distribution of varieties, the age of the trees, the condition of the orchards and the factors affecting their condition were considered in this study for the following reasons: (1) The vigor of the trees, the possibility of annual production and the age of trees are important factors in determining the volume which can be anticipated over a period of years; (2) the future relative importance of the varieties as to harvest and marketing season may create a very different need for washing and packing facilities than the present situation ^{4/}; and (3) these factors affect the quality of the fruit that may be expected from the area and, therefore, influence the grower's choice as to marketing agencies.

Only 10 percent of the trees in the orchards covered by the interview were of early varieties; 53 percent, of early winter; and 37 percent, of late winter varieties (table 2). Thus the summer varieties were relatively unimportant. They were frequently considered of little consequence by the grower; the apples were marketed only if prices were such as to warrant marketing them.

^{3/} U. S. Census, 1935.

^{4/} For example: 70 percent of the Golden Delicious trees were below 9 years of age. The variety was relatively unimportant in 1936, but can be expected to increase rapidly.

WESTERN ILLINOIS APPLE PRODUCING COUNTIES INCLUDED IN THE STUDY

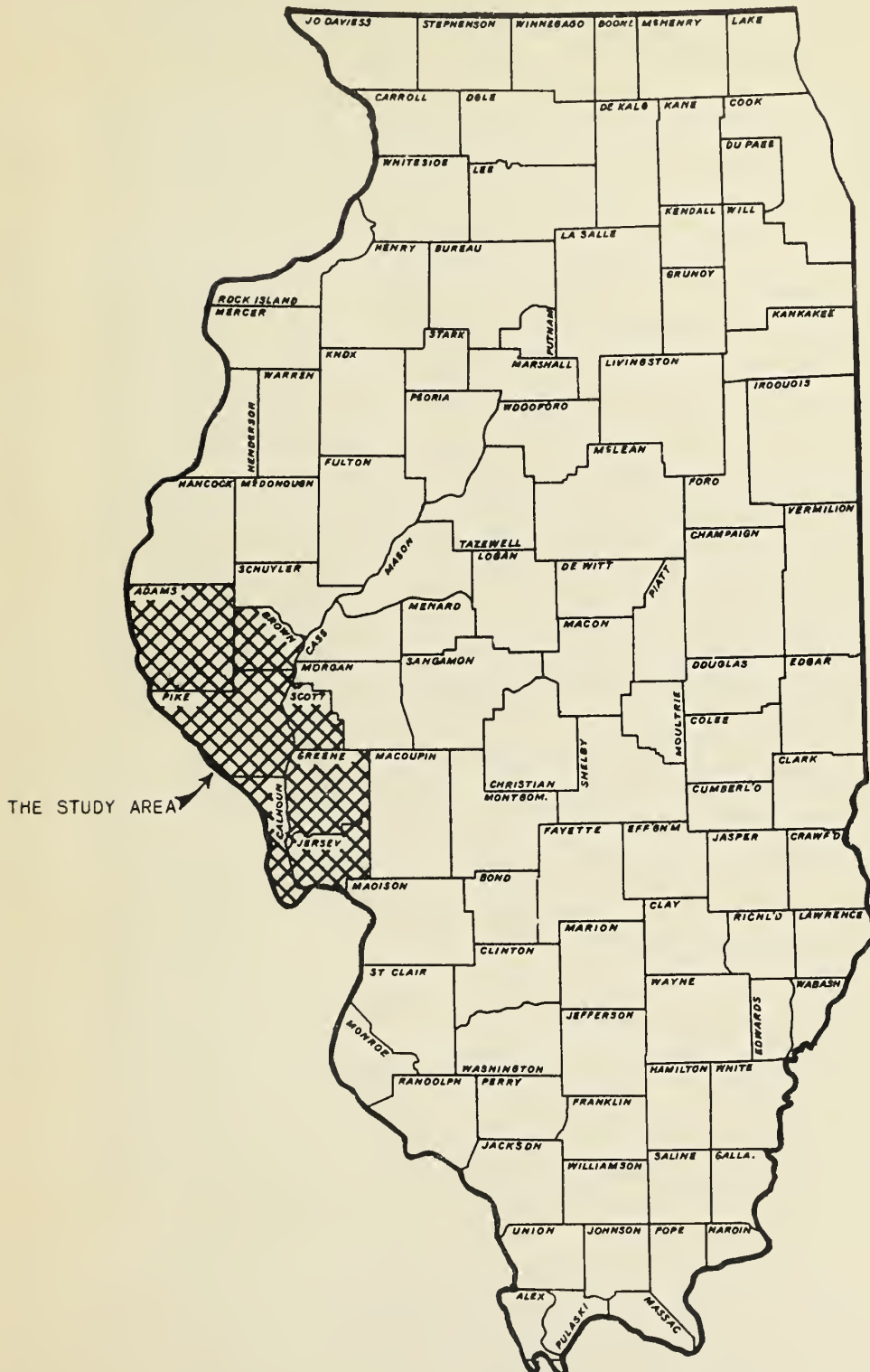


FIGURE 1. - These counties represent a highly concentrated section producing mostly late apple varieties.

Table 1. - Tenure and experience of orchard operators, and average size of orchard for 313 western Illinois growers, 1935.

County	Operators interviewed			On family land 1/	Total	Average acres in orchard business 2/	Operators in orchard business all their lives	Average years on this farm	Operators on present farm all their lives
	Owners	Tenants							
Calhoun									
North section . .	52	5	9	66	44.1	22.5	4	22.2	2
Center section. .	52	6	7	65	57.7	24.0	6	20.9	4
South section . .	41	4	1	46	48.6	20.7	17	13.6	8
All Calhoun . . .	145	15	17	177	50.3	22.6	27	20.4	14
Adams	21	3	3	27	59.9	21.2	10	19.4	10
Brown	3	0	0	3	38.3	15.6	0	23.7	0
Greene.	35	3	7	45	69.1	18.4	2	14.9	2
Jersey.	12	5	1	18	68.6	20.2	0	16.3	1
Pike.	33	5	0	38	74.2	16.6	8	13.2	1
Scott	5	0	0	5	23.0	25.3	0	13.6	0
Total	254	31	28	313	57.1	22.6	47	18.2	28

1/ "Postponed" ownership, as a son operating the estate of his father, or one operating an orchard owned by a still living, but inactive, parent.

2/ Operators in orchard business all their lives were not included in calculation of this average.

The early winter varieties were primarily Jonathan, Grimes, Delicious, Golden Delicious, Rome and King David. The late winter group was composed mainly of Willow Twigs, Winesap, Stayman Winesap, York and Black Twig. The growers made a strong effort to market all of the crops of these latter two groups including the lower grades and drops.

Averaging the orchards included in the study 22 percent of the trees of all varieties were below bearing age (1 to 9 years) while 70 percent were from 10 to 24 years of age and 3 percent were still older (table 2). The distribution of trees by age groups varied from county to county. Adams County had 30 percent of its trees below bearing age, while Jersey County had only 12 percent in that class. The percentage of trees over 24 years old ranged from a low of 3 percent in Pike County to a high of 20 percent in Scott County. Orchards from 10 to 24 years of age ordinarily are the most productive; this age group included the majority of the trees, ranging from 53 percent of the total number of trees in Adams County to 84 percent in Jersey County.

Assuming normal growing conditions, there are sufficient trees below bearing age to maintain the productive acreage of the area as a whole. The relative importance of early, early winter and late winter varieties, however, is expected to change somewhat within the area. There has been a noticeable shift toward the planting of early winter varieties as shown by the fact that 68 percent of all trees below bearing age were of these varieties (table 3). The trees 1 to 9 years of age in the early or summer varieties are only sufficient to maintain the present importance of the group. The present proportion (5 percent) of trees less than 10 years old in the late winter varieties is not sufficient to maintain the approximate one-third proportion which these varieties are of all varieties. Therefore, it appears that the main shift will be from the late winter to the early winter varieties.

The importance of the individual varieties which went to make up the total crop is shown in table 4. Jonathan led the list with a total of about one-fourth (26 percent) of all the trees. Willow Twig was second in importance with about one-sixth (17 percent) of the total number of trees. Delicious, Golden Delicious, Winesap, Grimes, and Ben Davis and Gano were about equally important varieties, ranging from around 10 percent to less than 7 percent of the total number of trees. The seven leading varieties accounted for over 82 percent of the total number of trees.

Table 2. - Percentage distribution of apple trees by season of marketing and age groups for 313 western Illinois apple orchards, 1936

County	Percentage of trees in age groups											
	Early varieties			Early winter varieties			Late winter varieties			All varieties		
	1-9 years	10-24 years	Over 24 years	1-9 years	10-24 years	Over 24 years	1-9 years	10-24 years	Over 24 years	1-9 years	10-24 years	Over 24 years
Adams	0.4	3.4	1.1	23.2	26.1	8.5	5.9	23.3	8.1	29.5	52.8	17.7
Brown	0	3.8	3.4	21.4	34.7	9.1	5.4	17.4	4.8	26.8	55.9	17.3
Calhoun	2.2	7.3	0.6	16.8	31.7	4.2	5.2	29.8	2.2	24.3	68.8	6.5
Greene	1.7	5.8	0	18.1	30.1	7.8	5.9	19.7	10.9	25.7	55.6	18.7
Jersey	3.3	11.2	0.1	2.1	39.4	0.7	7.1	33.0	3.1	12.5	83.6	3.9
Pike	1.1	8.0	0	14.4	41.4	1.1	2.0	30.0	2.0	17.5	79.4	3.1
Scott	0	0.3	0	12.5	54.6	0	3.0	10.4	19.5	15.5	65.3	19.5
Area 1/	1.9	7.4	0.4	15.1	33.8	3.8	5.1	28.8	3.7	22.1	70.0	7.9
Total												

1/ Weighted average based on all trees in area.

Table 3. - Relative importance of trees of nonbearing ages 1/
in early, early winter and late winter varieties, in 313
western Illinois orchards, 1936

Variety group	Percentage of trees of nonbearing age		Total area
	Calhoun County	Rest of area	
Early.	9.0	8.4	8.8
Early winter	69.6	66.4	68.2
Late winter.	21.4	25.2	23.0
Total.	100.0	100.0	100.0

1/ 1 to 9 years old, inclusive.

Table 4. - Number of apple trees of principal varieties, by age groups,
and percentage of nonbearing age 1/, 313 western Illinois orchards, 1936

Variety	Number of trees in age group			Total trees of all ages		Percentage of trees that are nonbearing
	1-9 years	10-24 years	Over 24 years	Number	Percentage	
Transparent.	3,193	9,291	512	12,996	2.1	24.6
Duchess.	2,385	10,370	412	13,167	2.1	13.1
Wealthy.	5,219	19,129	1,316	25,664	4.1	20.3
Maiden Blush	750	2,773	179	3,702	0.6	19.9
Jonathan	40,703	103,922	19,669	164,294	26.2	24.8
Grimes	5,150	33,346	3,804	42,300	6.8	12.2
Delicious.	19,170	42,581	685	62,436	10.0	30.7
Golden Delicious .	37,190	16,089	3	53,282	8.5	70.0
Rome	7,485	5,296	260	13,041	2.1	57.4
King David	1,157	5,610	115	6,882	1.1	16.8
Winesap.	6,637	43,820	2,198	52,655	8.4	12.6
Willow Twig.	16,004	84,343	5,772	106,119	17.0	15.1
Ben Davis & Gano .	6,169	27,865	10,817	44,851	7.2	13.8
York	762	6,180	681	7,623	1.2	10.0
Stayman.	2,055	4,687	429	7,171	1.1	28.7
Black Twig	582	7,977	1,344	9,903	1.5	5.9
Total all varieties. .	154,611	423,279	48,196	626,086	100.0	24.7

1/ Age: 1 to 9 years old, inclusive.

The ratio of trees below bearing age to those of bearing age indicates that there will be a shift in the relative importance of the individual varieties (table 4). About 70 percent of the Golden Delicious trees were below bearing age. Of the Rome Beauty trees, a relatively unimportant variety today, over 57 percent were below bearing age. There were 31 percent of Delicious trees below bearing age. Other varieties were: Jonathan, about 25 percent; Willow Twig, 15 percent; Ben Davis and Gano, 14 percent; and Winesap, 13 percent below bearing age.

Condition of the Orchards

The apparent condition of the orchards was estimated by inspection in terms of the percentage of stand, of the last season's growth, and of winter injury (table 5). Of the 310 orchards examined, there were 159 which had 90 to 100 percent of a stand of trees, while 32 orchards had a poor stand (below 67 percent).

The last season's growth was listed as medium to good for 282 of the 310 orchards, poor for 18, while 10 orchards were recorded as vigorous (table 5).

The drouth of 1934, the heavy crop of 1935, and the severe winter of 1935-36 resulted in considerable injury in some orchards as recorded in table 5 under "winter injury". About 50 percent of the orchards sustained severe-to-medium injury. This injury was most severe in the older orchards which bore a heavy crop in 1935. Some varieties were more subject to injury than others. Black Twig, York, King David and Delicious, which bore a heavy crop in 1935, were most susceptible. However, all trees over 24 years old suffered badly unless they previously had been in very good condition and if the 1935 crop had been too heavy.

Factors Affecting Condition

Some of the cultural practices which are largely within the control of the orchardist and which affect the condition of the orchards are shown in table 6. Over 95 percent of the orchardists interviewed made an attempt to prune the orchard. Though pruning according to their own ideas, their methods frequently were in accordance with recognized practice. Fifty percent of the orchardists practiced light pruning, which meant the removal of water sprouts, broken and dead limbs and only the worst cross limbs. About 12 percent practiced severe pruning, while about 33 percent practiced medium pruning. Medium pruning aims at getting some light into the center of the tree and making insect and disease control easier.

Table 5. - Condition of western Illinois apple orchards inspected; Fall of 1936

Measures of condition	Calhoun County orchards		Adams County orchards		Brown County orchards		Greene County orchards		Jersey County orchards		Pike County orchards		Scott County orchards		Total	
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
Percentage of stand Less than 66 2/3..... 66 2/3 to 89..... 90 to 100.....																
	10	8	3	5	1	2	3	0	0	32						
	24	35	16	8	1	7	21	6	1	119						
	32	21	26	14	1	9	21	31	4	159						
Previous seasons' growth: Vigorous..... Good..... Medium..... Poor.....	2	2	1	1	1	1	2	0	0	10						
	31	19	17	11	0	6	22	19	0	125						
	28	37	24	14	2	11	18	18	5	157						
	5	6	3	1	0	0	3	0	0	18						
Degree of winter injury: Severe..... Medium..... Light.....	16	20	12	8	2	4	10	0	0	72						
	21	20	11	7	0	6	10	5	2	82						
	29	24	22	12	1	8	25	32	3	156						

Table 6. - Classification of western Illinois apple orchards inspected according to factors in care and management which affected their condition; 1936

Factors affecting condition	Calhoun County orchards		Adams County orchards	Brown County orchards	Greene County orchards	Jersey County orchards	Pike County orchards	Scott County orchards	Total	
	North section	Center section								
	Number	Number	Number	Number	Number	Number	Number	Number	Number	
Total orchards inter-viewed.....	66	64	45	27	3	18	45	37	5	310
Pruning: Severe.....	15	8	2	3	1	4	6	0	0	39
Medium.....	22	26	9	9	0	6	16	14	0	102
Light.....	27	28	33	12	2	4	22	22	5	155
None.....	2	2	1	3	0	4	1	1	0	14
Soil Practice:										
Good.....	28	22	11	14	2	6	15	25	2	125
Fair.....	33	32	29	8	0	6	22	12	3	145
Poor.....	5	10	5	5	1	6	8	0	0	40
Sanitation:										
Good.....	28	26	11	14	1	6	16	23	2	127
Fair.....	31	29	32	8	1	8	21	13	3	146
Poor.....	7	9	2	5	1	4	8	1	0	37
Orchards fertilized.....	36	40	20	12	2	8	28	18	0	164

Forty percent of the orchardists used good soil practices, while about 13 percent neglected the soil to such an extent as to be recorded as poor. Throughout most of the area, sod culture was practiced. Frequently, the sod was composed of bluegrass, while in other cases a legume was used; however, a ground cover, largely of weeds, was not uncommon. In good practice the orchard was mowed twice a year and disked frequently enough so that the soil would take up water rapidly.

Under the heading, "sanitation", an attempt has been made to group together those practices which tend to keep the orchard free of insects and diseases, such as removal of brush and rubbish, scraping of old tree trunks, banding, and spraying to control scale and canker diseases. Forty-one percent of the orchards were classified as having good sanitation and only about 12 percent classified as poor. It is interesting to note how closely the data on soil practice and on sanitation check. In general, the two factors received about the same attention from a given orchardist.

It is generally agreed that fertilizers are necessary to good orcharding in Western Illinois; however, only about 53 percent of the orchardists interviewed had applied fertilizers during 1934-35 and 1935-36 (table 6). Many of the growers who formerly used fertilizers regularly, have neglected to do so recently because of lack of funds.

The above data do not give a complete picture of the condition of the orchards, as the adverse weather conditions and the lack of good cultural practices caused by financial depression have been of too short duration for the final effects to show clearly. The very dry summer of 1936 greatly reduced the vigor of many trees. The eventual result of these adverse conditions cannot be predicted with any great degree of accuracy; much depends upon the weather conditions of the next few seasons. The present indications are for a very large crop in 1937 and should there be insufficient rainfall to properly mature the crop, very severe injury to the trees is likely to result.

Many of the orchards in the entire area produced no apples in 1936 and only a few had an average crop; total production for the area was about 20 percent of an average crop. In view of the prospects for a heavy crop in 1937 together with the weakened condition of the trees, it appears that biennial production will be much more in evidence in the future than in the past. This means

that any washing and packing facilities set up to take care of the crops produced must be prepared to handle a large crop one year and a light crop the next.

Equipment for Orchard Care

There were 366 spray machines owned by the orchardists interviewed. These machines had to cover 17,898 acres of orchard, an average of 49 acres to a 200-gallon machine (table 7). The machines ranged in age from 1 year or less to 21 years. Most of the older machines had been repaired frequently and in many, a new engine or pump had been installed. However, these old machines cannot be expected to generate the desired pressure or to operate continuously without breakdowns.

Descriptions of condition were obtained on only about 50 percent of the machines. Those machines for which information was not obtained were mostly older machines and it is, therefore, unlikely that their condition would be as good on the average as those described. Seventy-one percent of the machines for which descriptions were obtained were in good condition, while over 11 percent were in poor condition.

Horses were used as a source of power to move the sprayers by 278 of the 313 growers interviewed; tractors were used by 18, and both tractors and horses were used by 11 growers (table 7).

According to the best information available, a 200-gallon spray rig is adequate for spraying about 25 acres of bearing orchard on the average; consequently, in the area studied there appeared to be a shortage of about 50 percent in the spray machinery required to give adequate control of diseases and insects and to assure a crop of high quality.

Water Supply

Two of the orchardists interviewed attempted to control insects and diseases by dusting; three made no attempt to control insects and diseases, while the others used sprays (table 8). During the last few dry seasons, the question of an adequate water supply has been of much concern to many growers. The data presented show that 137 (or over 43 percent) of the orchardists used some form of ground water such as springs, wells or city water supply for spraying. Frequently this source was not adequate, especially in seasons of prolonged drouth which affected most of the springs and some of the wells. Ninety-seven, or about 30 percent, relied upon surface water collected in ponds or cisterns. On most farms, the supply was inadequate for a full spray schedule during 1936. Seventy-two growers,

Table 7. -- Spray machinery equipment of 313 western Illinois apple orchards, 1936.

	County							Total area
	Adams	Brown	Calhoun	Greene	Jersey	Pike	Scott	
Growers interviewednumber	27	3	177	18	45	38	5	313
Total acreage in orchard.acres	1,618	115	8,902	1,243	3,087	2,818	115	17,898
Spray machines.number	36	3	195	24	56	47	5	366
Average capacity.gallons	219	283	186	267	200	204	210	200
Age of spray machines:								
Rangeyears	1-21	2-10	1-20	2-20	1-18	1-9	1-8	1-21
Averagedo	6.6	5.7	6.4	10.1	6.0	4.3	4.7	6.4
Condition of machines:								
Good.number	4	3	89	14	16	5	2	133
Fair.do	2	0	27	1	5	0	0	35
Poor.do	4	0	12	2	2	0	0	20
Not reported.do	26	0	67	7	33	42	3	178
Power to move sprayers:								
Growers using horses.number	27	2	166	13	35	30	5	278
Growers using tractors.do	0	1	6	3	2	6	0	18
Growers using tractors and horses.do	0	0	3	1	5	2	0	11
Average acreage per spray machineacres	44.4	38.3	45.6	51.8	55.1	60.0	23.0	48.9

Table 8. - Source and convenience of water supply used for spraying,
313 western Illinois orchards, 1936

Source and convenience of water supply	Calhoun County										Total area
	North section	Center section	South section	Adams County	Brown County	Greene County	Jersey County	Pike County	Scott County		
	Number	Number	Number	Number	Number	Number	Number	Number	Number		
Growers using:											
Ground water 1/	39	23	14	8	2	10	19	17	5	137	
Surface water other than river 2/	19	21	11	11	1	5	18	11	0	97	
River.	0	0	2	0	0	0	0	0	0	2	
Ground and surface	8	20	10	7	0	2	7	8	0	62	
Ground, surface and river.	0	0	5	0	0	0	1	0	0	6	
Ground and river	0	0	3	0	0	0	0	0	0	3	
Surface and river.	0	0	1	0	0	0	0	0	0	1	
Elevated tanks 3/	23	16	8	9	2	6	9	19	2	94	
No water:											
Orchard not sprayed	0	1	0	0	0	1	0	1	0	3	
Dusts for control	0	0	0	1	0	0	0	1	0	2	
Average distance from water supply to orchard.miles											
	.13	.10	.09	.06	.42	.07	.26	.79	.06		

1/ Spring, creek when spring fed, well or city water.
2/ Pond or cistern.
3/ Included also in those above.

or 23 percent, had more than one source of water which included some kind of ground or surface supply. Twelve orchardists in the area reported using the river, but only two relied upon it for their total supply. Much can be done to assure a more adequate water supply and so aid in the production of higher-grade fruit. In some cases, large reservoirs can be made easily, while in other cases river water can be made available.

Thirty percent of the growers had elevated tanks on land sufficiently high so that the water could be piped into the machines. A number of the other growers had pumps which filled the spray tanks in a few minutes. The water supply usually was within a short distance of the orchard, although in many cases it was necessary to haul the water up steep grades.

GEOGRAPHIC, SOCIAL AND ECONOMIC SITUATION OF AREA

Geographic Location

The western Illinois apple area, as referred to in this publication, includes seven counties located in the west central part of the State. The southern edge of the area begins at the point where the Illinois River empties into the Mississippi, and extends north for a distance of about 90 miles. The Mississippi River forms the western boundary and the bluff lands east of the Illinois River represent the eastern boundary.

The transportation facilities are well developed except for Calhoun County and small isolated areas elsewhere. Calhoun County is a long neck of land located between the Mississippi and Illinois Rivers. It is slightly over 36 miles long and varies in width from about 4 to 16 miles. Calhoun County is without a railroad and until recently transportation to and from the county was mainly by boat on either the Illinois River or the Mississippi River. More recently motor transportation has become very important; however, the highways of the county are poorly developed as compared with those of the State as a whole. The highways leading to the East, South, and West, with one exception, cross the river by ferry. There is one paved road in the county which enters from the north, travels along the Illinois River side, a total distance of less than 20 miles, and crosses into Jersey County at Hardin. The highway leading south from Hardin and the one on the Mississippi side are all-weather roads but only a very few of the roads connecting these two are improved; consequently, bad weather interferes with the movement of the crops to market. These conditions, together with the steep grades of many of the hills, have retarded the activity of truckers who would like to buy directly at the farms. Highway improvement has been rapid during 1935 and 1936 and with the completion of the proposed developments, the apple crop will move with much greater ease and should move at a much reduced transportation cost.

The Calhoun County apple crop was shipped out of the county from several different points in 1935 (table 9). About 64 percent of the total crop went across the bridge to East Hardin where part moved on to storage or to consuming centers by truck and part was loaded in railway cars. A small quantity moved north out of the county by way of Atlas, on the gravel highway on the Mississippi side, while the remainder of the crop left the county by ferries the most important of which were at Golden Eagle, West Point, Hamburg and Grafton.

There are two apple areas in Jersey County. One, located on the bluff land along the Illinois River and to the north of Grafton, has so far rather poorly developed highways. The growers in this area are in a position similar to that of the Calhoun County growers in that they cannot rely upon truck buyers coming to their farms as an outlet for a large percentage of their crops. However, if the growers move their crops to Grafton for washing and packing, good outlets are available by highway and by rail.

Table 9. - Apple shipments according to points of exit, and amount used for cider; Calhoun County, Illinois, 1935 ^{1/}

Points of exit	Total shipments	Percentage passing through indicated exit
	<u>Bushels</u>	<u>Percent</u>
Atlas to Hannibal.	20,000	0.8
Hamburg ferry.	80,000	3.3
West Point ferry	142,680	5.9
Golden Eagle ferry	248,000	10.3
Grafton ferry.	75,140	3.1
Kampsville ferry	68,608	2.8
Hardin bridge.	1,548,170	64.1
Total shipments.	2,182,598	90.3
Quantity used for cider. . .	234,565	9.7
Total production	2,417,163	100.0

^{1/} Data supplied by Division of Markets, Illinois Department of Agriculture.

The other orchard area, in the vicinity of Jerseyville, is upon a more level type of land and in a general farming area. The highways leading to the individual farms usually are not all-weather roads, yet much of the fruit produced here is washed and packed in Jerseyville where good highways lead to the North, South, East and West.

Similar to the Jerseyville orchard area are both the Hillview area located in Patterson Township of Greene County, and a part of the Griggsville area of Pike County. Good highways lead into these areas, although many individual orchards are not located on all-weather roads. However, since the roads are more level and are wider, the trucker does not hesitate so to travel them.

Social Situation

The religious groups and the nationalities found among the apple orchardists of Western Illinois are not such as to cause concern in organizing washing and packing sheds or in centralized sales agencies. A more serious hindrance to cooperation, especially in isolated districts, is the desire of the grower for individual control. This desire in most cases has arisen from experiences with outside agencies which the grower has found disappointing because of misrepresentation or lack of understanding; these early experiences are discussed later in connection with the history of the area.

Economic Situation

Importance of Orchard Enterprise

Commercial orcharding within the Western Illinois apple area is a specialized industry which has developed only in localized areas. The largest of these localized areas is that of Calhoun County in which apple production is the leading industry of the entire upland. In the other counties, commercial production is confined to comparatively small districts, a township or less in extent. These areas are frequently the outgrowth of the influence of an individual pioneer grower; however, they are in most cases well located insofar as soil type and air drainage are concerned. At the same time these areas generally are located in rough lands where highway development, being more expensive, often has lagged behind that of other communities.

The importance of orcharding as a source of income to those engaged in the industry is illustrated by the fact that over 50 percent of the cultivated land of growers interviewed was in orchards (table 10). The

balance of their cultivated land was used to grow feed for the work stock and for a few cows and hogs.

Less than 60 percent of the total farm area owned by these orchardists was in cultivation (table 10), in consequence of the usual location on the rugged bluff lands along the river. Much of the land is allowed to remain in native timber, which may serve as a source of additional income in the form of railway ties, barrel staves, etc.

About 39 percent of Calhoun County is composed of eroded silt loam, largely unsuited to general farming because of its rough topography. It is used in part for orcharding, but much of it is too steep even for this purpose. Orchard planting probably should not be greatly extended on this land because the cost of spraying and other operations is greater than that on lands with a more favorable topography.

Table 10. - Acres in farm, in cultivation, and in orchard, for 313 orchardists in western Illinois, 1935

County	Orchardists interviewed	Total acreage in farms	Total acreage in cultivation	Total acreage in orchard	Percentage of total farms in cultivation	Percentage of cultivated area in orchard
	<u>Number</u>	<u>Acres</u>	<u>Acres</u>	<u>Acres</u>	<u>Percent</u>	<u>Percent</u>
Adams. . . .	27	5,321	4,151	1,618	78.0	39.0
Brown. . . .	3	424	205	115	48.3	56.1
Calhoun. . .	177	36,968	17,667	8,902	47.8	50.4
Greene . . .	45	3,830	2,423	1,243	63.3	51.3
Jersey . . .	18	6,844	4,345	3,087	63.5	71.0
Pike	38	6,177	4,198	2,818	68.0	67.1
Scott. . . .	5	620	470	115	75.8	24.5
Total area	313	60,184	33,459	17,898	55.6	53.5

Brownish-yellow gray silt loam, the second most extensive soil type within the county, accounts for about 21 percent of the area. This is the best soil in the county both for general farming and orcharding. Throughout most of the county it occurs in narrow irregular areas on the divides, but in the southern part of the county the divides are lower and broader. There is no heavy subsoil so that tree roots can penetrate deeply.

These two soil types, which make up 60 percent of the area of Calhoun County, are the important orchard soils. The topography and the location of the soil types are such that the orchards are usually found in irregular spaces on the upland plateaus and ridges.

The same general topographic condition exists in other nearby localities, especially those referred to as Grafton, Griggsville, Nebo, and Lima, and to a lesser extent in the Hillview and Barry districts. In these areas, the spaces devoted to orcharding are smaller and more generally intermingled with general livestock farming; however, the individuals engaged in the production of fruit usually rely upon fruit for their income as heavily as do those in Calhoun County.

An important problem facing agriculture today is that of soil conservation. This problem is particularly acute in the area studied. As stated above, most of the orchard sections are located on very rough land, with deep soil. In most cases, this soil is low in organic matter and erodes badly when placed under cultivation. Orchardring is one way of attempting to increase the returns from the land, and at the same time prevent erosion. General livestock farming is practiced to some extent because of the pasture afforded by the land too rough for cultivation, the more level lands being used to produce grain and feeds. The farm acreage operated by the average orchardist is not sufficient to support a family by general farming. Orchardring is the only practicable enterprise to which the orchardists in the area have been able to turn for additional income.

Size of Orchard Holdings

The size of orchard holdings under the supervision of one man varied from the 4-acre orchard, the smallest considered as a commercial orchard in this study, to over 640 acres. There were 674 operators in Calhoun County that classified as commercial orchardists on this basis. Of this number, 377 growers had 20 acres or less in orchard, 159 had from 21 to 40 acres, 104 had from 41 to 80 acres, and 34 had over 80 acres in orchard. The largest operator had 500 acres in orchard, while the average for the county was only slightly over 22 acres.

In the sections outside of Calhoun, the number of commercial orchardists was not easily determined, as many of the larger farm orchards were of older trees which had been severely hit by the drouths of 1934 and 1936 along with the extremely cold winter of 1935 and may be, therefore, no longer of commercial importance. There has been a slight tendency in some of the other sections, such as Grafton, Hillview and Griggsville, for orchard companies to take over large acreages and to operate them as a unit. The capital for most of these companies has come from outside sources, frequently from the fresh-fruit and vegetable wholesale field.

HISTORICAL DEVELOPMENT OF THE INDUSTRY

Increasing Cost of Production and Harvest

In western Illinois, the apple industry has increased in importance somewhat over a period of years, while in the State as a whole it has declined, as indicated by changes in the total number of trees. In 1934, over 29 percent of the apple trees of the State were located in the western Illinois area (table 11). The progressive decline in the number of apple trees in Illinois as a whole is a result of largely the decline of "family-sized" orchards whose owners feel they cannot afford to give them the care required to cope with present insect and disease enemies.

Along with the increase in number of trees, the introduction and multiplication of insects and diseases made the orchardist's problem of high-quality production increasingly difficult. Meeting the market requirements for standard grades, compliance with the spray-residue regulations, and competition from other areas all operated to reduce the growers' net income.

In the early days of the apple industry in Calhoun County, harvesting and marketing methods were fairly simple. The older orchardists tell of the pickers piling the apples in long ricks in the orchard and of the packers picking them up from the ground and placing them in barrels. Later, the pickers and packers worked together; the pickers would empty their sacks upon a homemade sorting table that was tilted so that the apples would roll toward the lower end, under which a barrel was set.

In 1936 such homemade sorting tables were still in use by many growers who packed at home, but the barrel had given way to the bushel basket. Orchardists who had their apples washed and packed at a commercial shed usually put the apples, as picked, into field crates in which they were hauled to the shed. Washing has added another expense to the grower's costs.

Table 11. - Number of apple trees and bushels harvested in the area surveyed 1/ and in the State of Illinois 2/, Census years, 1899-1934.

Year	Number of apple trees in		Percentage of State total trees in western Illinois	Apples harvested in		Percentage of State total harvest in western Illinois
	Illinois	Western Illinois		Illinois	Western Illinois	
	<u>Number</u>	<u>Number</u>	<u>Percent</u>	<u>Bushels</u>	<u>Bushels</u>	<u>Percent</u>
1899	13,430,006	1,049,833	7.8	9,178,150	679,753	7.4
1909	9,900,627	1,064,777	10.8	3,093,321	640,367	20.7
1919	6,938,949	1,137,786	16.4	4,673,117	1,667,440	35.7
1929	5,472,936	1,951,022	35.6	3,025,895	1,169,971	38.7
1934	4,854,929	1,425,978	29.4	2,723,819	1,790,534	65.7

1/ Adams, Brown, Calhoun, Greene, Jersey, Pike and Scott Counties.

2/ Source: 1935 Census of Agriculture, Bureau of the Census, U.S. Department of Commerce.

Improvement in Transportation Facilities

Transportation facilities in Calhoun County have changed greatly during the last 15 years and have had a profound influence upon marketing methods. In 1922 over 67 percent of the crop moved by boat; in 1927 only 25 percent; and since 1930 no apples have gone out by the rivers. Before the hard road and the bridge at Hardin were established, apples could be moved from the county to the west, south or east only by boat. Then the barrelled apples were hauled to the river bank to wait for a boat to transport them to market. In 1931, a highway bridge across the Illinois River at Hardin was completed, connecting with the first hard road leading into the county. Since then the road has been completed northward to connect with U. S. Route 36, at Detroit in Pike County. This highway through Hardin has become a link in one of the leading routes to St. Louis from points north and northwest.

Decline of Old-Time Apple Dealers

Formerly, not only in Calhoun County, but also throughout this area studied, apple crops frequently were sold on the tree to dealers for a lump sum. Often the dealer assumed all responsibility from the day the deal was closed; in case of hail or wind, the loss was the dealers'. He not only marketed the crop but harvested and packed it as well. In 1936, apple dealers were not nearly so active as in earlier times and assumed fewer risks of losses before harvest. They preferred to buy on the basis of grade and quality after packing. The trucker-buyer is a relative newcomer, dealing mostly in ungraded bulk apples. The speculator has largely disappeared from the market, so that the grower has found it more and more necessary to store apples until the consumer desires them.

These changes in cost of production, in transportation, and in method of sale have taken place somewhat faster than growers in general have been able to thoroughly adapt themselves to them.

Early Attempts at Cooperation

The expense of marketing apples through the usual wholesale channels and marketing agencies is considered high by the producer. Within the recollection of the older men, there have been several attempts among growers in Calhoun County to band together to overcome their difficulties in harvesting, packing and marketing.

One of the first of these attempts was the cooperative purchase of a boat to deliver growers' apples to the St. Louis market. This venture was short-lived because the charge for cooperative delivery was underbid by the independent packet companies and because members were not loyal to their own company.

In another early attempt, a group banded together and signed agreements to market their crop cooperatively or pay a stated fine per barrel. An "old-line" apple buyer was employed as salesman. He made a large volume of contract sales before harvest, but at a figure which later proved to be too low because of a rising market. The members found they could sell outside the association, pay their fines, and still be ahead; consequently, the association was forced to purchase apples at prevailing prices to fill the contracts. It is also stated by some growers that the association experienced difficulty in obtaining boat transportation to move their apples to

market until after the quality had deteriorated. At the close of the season, the association was insolvent and no longer continued in business.

A small group of orchardists near Kampsville formed a cooperative association about 1928 to grade, pack, and sell their apples through an independent sales agency discussed below. For a time after the independent agency left the area, one of their members acted as a salesman. Returns were made on a pooled basis. Apples are no longer sold through this association, though a few members still use the packing shed.

About the same time, growers shipping apples by rail from east Hardin were encouraged to load and ship cooperatively. By this means, carload lots were assembled by grades from the fruit of a number of growers, each of whom packed individually. Returns were pooled to give the same price to each contributor to a particular carload.

In 1927, an independent marketing agency drew about 40 growers into an unincorporated group to grade and pack their apples under the agency's supervision, using the equipment which the agency installed at Hardin. At first by oral, and later by written agreement these apples were to be sold by the agency for a 10-cent brokerage per bushel. Returns on a pool basis by varieties and grades were made by the agency to the individual growers. After two or three years of operations reasonably satisfactory to the growers, the group incorporated as a cooperative association, the Calhoun County Apple Growers. For a very short period in 1931, they transferred the selling of their crop to the Illinois Fruit Growers Exchange, a cooperative sales agency, but later returned to the independent agency with the provision that payments to individual growers be calculated and made by a person designated to represent the growers. The exact manner in which returns were calculated by this representative was not determined in the course of this study, but apparently it was not on the ordinary pool basis. Progressively declining returns and mutual dissatisfaction of agency and growers resulted in permanent discontinuance of operations by this agency in the area. By common consent, the grading and packing equipment became the property of the growers.

In the following year (1932), about half the original number of growers in the group continued to operate the shed, purchasing supplies on credit through the Calhoun County Farm Bureau Exchange. ^{5/} By the end of 1932, an unpaid account held by the exchange, resulted in the

^{5/} This exchange is a subsidiary but financially independent organization, sponsored by the Calhoun County Farm Bureau.

growers giving the exchange a mortgage upon the shed equipment. During the next year or two, the membership declined to about 15; also, the old shed was torn down, moved and rebuilt at east Hardin on land leased by the exchange. In 1934, members of the group failed to agree on a manager, and the exchange operated the shed to do custom packing for commercial buyers. The following year, the exchange obtained title to the shed and equipment, with the provision for retiring the interest of the remaining members. In 1936 the shed was operated for custom packing, according to growers' specifications as to grade and pack. During part of the 1935-36 season, the Calhoun County Farm Bureau Exchange offered a limited sales service to exchange members through an office maintained in St. Louis. Plans are being made by the exchange to operate the shed as a cooperative washing and packing plant, with emphasis on a complete sales service.

The washing and packing shed at Grafton was built in 1930 by a local cooperative association, the Grafton Fruit Growers. It was financed largely by credit from equipment manufacturers and a mortgage-secured loan from the Federal Farm Board. Operations started with the 1931 crop, but because of short tonnage in 1932 and 1933, the association could not meet its required schedule of payments to the farm board. In 1933, the newly formed Farm Credit Administration took over this loan among other assets of the Federal Farm Board. The Illinois Fruit Growers Exchange made up the accumulated deficit and guaranteed future payments on schedule to the Farm Credit Administration. To protect itself, the exchange took a mortgage on the shed and equipment at Grafton, but did not take a deed to the property; the management of the exchange is willing and anxious to relinquish any local financial control if and when the local group can finance its affairs independently. A little over one-fourth of the volume of the Grafton shed in 1935 was handled on a custom-pack basis for nonmembers in order to help lower operating costs per bushel. Members contribute five cents per bushel packed out, over and above the washing and packing charge, as a retain to be used to buy stock ownership in their local association. Nonmembers get the same washing and packing services without being required to purchase stock in this manner; as far as immediate cash outlay is concerned, they are in a better position than the members. The volume handled to date (1937) has not been enough for efficient operation; however, if the State regulations as to spray residue are more completely enforced in the future so as to oblige more growers to wash their fruit, the shed would be offered much more volume than it could handle with its present facilities.

Cooperative efforts among orchardists elsewhere in the area have been few and the number of persons involved in any one effort has been small. For the most part their accomplishments have been unsatisfactory.

The troubles and the all-too-often failures of these various cooperative ventures arise primarily from one or more of the following conditions:

1. The lack of specific objectives;
2. Failure to organize and do business on a definitely cooperative basis;
3. Insufficient capital invested by grower-members to give financial stability to the organization;
4. Short-lived loyalty of members in the face of temporarily more attractive returns outside the association;
5. Lack of adequate accounting for all transactions;
6. Internal friction over business methods, the choice of a manager, and the dissimilar interests of large and small growers; and,
7. Lack of appreciation of the fact that success comes not merely by the will to cooperate, but also by the application of sound conservative business methods.

MARKETING

The problem of marketing apples will be complicated by the necessity for moving a heavy crop one year and a light crop the next, a consequence of the alternate bearing to be expected throughout much of this area. The drouth of 1934, the heavy crop and the leaf diseases of 1935, the severe winter of 1935-36, and the severe drouth and hot weather of 1936 have greatly weakened the trees. They had sufficient vigor to set a heavy fruit bud for a 1937 crop, but if weather conditions are favorable for a crop to set, it is very questionable if the trees can mature the crop and set bud for a crop in 1938. Good cultural conditions, the use of fertilizers and the practice of thinning may correct this condition eventually, but unless some weather condition interferes, alternate heavy and light crops may be anticipated.

As previously pointed out, the early apple varieties are of little importance in this area, accounting for only about 10 percent of the trees. The important marketing season opens with the harvest of the early winter varieties and continues through the harvest of the late winter varieties. In 1936, eight varieties represented 88 percent of the trees of bearing age (table 12). Jonathan and Willow Twig together amounted to more than half of this group, and to nearly half of all varieties. The same eight varieties also accounted for 88 percent of the trees of nonbearing age, but the relative importance of the individual varieties differed considerably. The distribution of the trees of nonbearing age indicates that in future years, though Jonathan will retain primary importance, it will be closely followed by Golden Delicious. A trend is clearly indicated toward more of the early winter varieties, Jonathan, Golden Delicious and Delicious, and less of the late winter varieties, Willow Twig, Winesap, Ben Davis, and Gano.

Quality and Pack

According to the estimates of the growers interviewed, their crops in 1935 averaged a little over 50 percent U. S. No. 1. This may be compared with 45 percent recorded by the packing sheds. The growers frequently complained that the packing sheds did not pack a sufficiently large percentage of No. 1's.

Table 12. - Number of trees of important varieties in orchards of 313 western Illinois apple growers interviewed, 1936

Variety	Percentage of trees in age group specified	
	Below bearing age 1/	Bearing age
	Percent	Percent
Jonathan.	26.4	26.2
Willow Twig	10.4	19.2
Winesap	4.3	9.8
Delicious	12.4	9.2
Ben Davis and Gano.	4.0	8.2
Grimes.	3.3	7.9
Wealthy	3.4	4.3
Golden Delicious.	24.0	3.3
Total, these varieties	88.2	88.1

Data based on numbers of trees shown in table 7.

1/ One to nine years old.

It cannot be expected that a uniform pack of western Illinois apples will be marketed so long as approximately two-thirds of the growers pack their own fruit, as indicated by the survey.

While asserting that apples of at least as good quality as those grown anywhere else can be and are grown in the area, most of the wholesale dealers criticized the western Illinois pack in general in one or more of the following ways: (1) There was no attempt among growers to market a uniform pack; (2) many growers greatly over face, both as to size and to color; (3) a given pack frequently meets no standard even though marked a U. S. No. 1, 2-1/2 inch minimum. The face is typical of what the face should be, but within blemishes are too frequent and severe for the grade; size and color do not hold up; (4) grades of a grower will vary from year to year. Because of these criticisms, the wholesale dealers stated that, in general, they would much rather handle apples packed in some of the more distant areas.

Present Washing and Packing Facilities

Two hundred and five growers, or 65 percent of those interviewed, were packing their own fruit. Only 39 growers, or somewhat over 12 percent, were using a cooperative washing and packing shed, and several of these growers were dictating their own style and grade of pack for their own fruit. Growers who neither packed their own fruit nor used a cooperative packing shed generally sold their fruit to some private concern which washed and packed the fruit and paid for it according to the quantity and grade "packed out". A few growers disposed of their entire crop by bulk sales of unwashed, unsorted fruit to trucker-buyers.

One hundred fifty-six growers, or nearly 50 percent of those interviewed in the area had their own packing sheds. Such sheds ranged from tin-roofed shelters and abandoned houses and barns to rather expensive permanent buildings equipped with mechanical graders and washers.

The Federal and State spray residue laws now in force make it necessary for growers who follow the recommended spray schedule to wash their fruit. A few of the growers have installed the necessary equipment; more have found it impossible because of the lack of sufficient water supply. In addition, the smaller growers particularly find the expense of installing and maintaining the equipment prohibitive. Therefore, one of the major problems facing growers is to find a way to comply with the laws.

There were 19 packing sheds with washing equipment in Calhoun County 6/, seven in Pike, four in Jersey, three in Adams, two in Greene, and none in Scott or Brown Counties. Fourteen of the sheds in Calhoun County were owned by individual growers; two, by private companies doing custom packing for growers; two, by buyers who packed the fruit they purchased; and one, by a cooperative group. Three of the grower-owned sheds were located in the northern section of the county, nine in the central section, and two in the southern section.

While it is manifestly impossible to state one set of specifications as to the size and equipment of a cooperative washing and packing shed which would meet the needs of every group of orchardists, a brief discussion of approximate costs and volume may help growers develop more concrete ideas of their own needs.

6/ Including three sheds in East Hardin, Jersey County.

Information gained from interviews with packing shed operators in Illinois and in northeastern Kansas indicates that efficient operation of a cooperative washing and packing shed requires a minimum seasonal volume of from 90,000 to 110,000 bushels of apples. In the western Illinois area studied about half the bearing, and two-thirds of the nonbearing trees are of the early winter varieties--Jonathan, Grimes, Delicious, and Golden Delicious. The harvesting season of these varieties normally extends over about 21 days (table 19). Thus, on the basis of the minimum volume suggested above, a shed in this section would have to be equipped to handle around 48,000 bushels in 21 days, or about 2,400 bushels per day. Washing and packing equipment adequate for such volume would cost in the neighborhood of \$5,000, but with a possible range of at least \$1,000 in either direction, depending upon the type and completeness of the equipment.

The cost of a building to house this equipment and provide adequate space for operations might vary all the way from a few hundred dollars for an organization able to convert an abandoned warehouse or garage, to \$15,000 or more for a completely new shed. In all instances, it is essential to keep the cost of the shed as low as possible.

An organization washing and packing about 100,000 bushels per season might have an operating cost exclusive of interest, depreciation and repairs of 10 to 13 cents per bushel packed out. Package costs, including liners, caps, etc. would probably be from 12 to 15 cents per bushel. Provision also would have to be made for interest, depreciation, repairs and deductions to acquire ownership. An association providing both the washing and packing service for about 100,000 bushels would need operating capital of approximately \$25,000. If merely a washing service were provided, operating costs, particularly for labor, would be less. Association contracts with the individual growers probably should provide that washing and packing shed charges be paid as the packed fruit is removed from the shed. If the association by its contracts with growers were the salesman for the fruit, it might place the fruit in storage and obtain a commodity loan, the proceeds of which could be used to pay off the shed charges and make a small advance to growers. By purchasing packing supplies on time, the amount of operating capital could be reduced, perhaps at the loss of cash discounts. 7/

7/ Further discussion of possibilities for financing the organization and operation of cooperative associations may be found on pp. 70-72.

Necessary Capacity of Equipment

In order to determine the capacity of washing equipment necessary to care for the crop of a given area, it becomes necessary to consider variety distribution in relation to time of harvest, washing and packing. Jonathan, Grimes, Delicious and Golden Delicious are the four varieties that make up the majority of the early winter crop which must be harvested over a comparatively short period of time. The actual harvesting time for these varieties depends upon the season, but usually averages about three weeks. In most cases, the volume of these four varieties passing through the shed in 21 days will determine the necessary capacity of the washer. The term, "peak period volume", as used hereafter will indicate the combined volume of the four varieties, Jonathan, Grimes, Delicious, and Golden Delicious, which, it is assumed, must be washed and packed within 21 days. The volume of these four varieties was determined for the 1935 crop according to formulae appearing in footnote 2 to table 13. The 1935 production was used on the premise that washing equipment should be adequate for a maximum crop.

Growers report that under practical operation, a washer will handle only about 50 percent of the manufacturer's rated capacity. Better shed arrangement and operation might correct a part or all of this discrepancy. In determining the need for additional washing facilities, the washers in the area have been assumed to have a capacity equivalent to 50 percent of the manufacturers' rating on the basis of a 10-hour operating day.

In the study of the additional washing facilities needed, it was assumed that washing facilities would be ample to care for the entire crop if they could handle the "peak period volume". The geographic location of the orchardists made it logical to combine the growers into the following groups:

- Southern section of Calhoun County
- Central section of Calhoun County
- Northern section of Calhoun County
- East Hardin group of Jersey County
- Grafton group of Jersey County
- Jerseyville group of Jersey County
- Patterson Township group of Greene County
- Nebo group of Pike County
- Summer Hill group of Pike County
- Barry group of Pike County
- Griggsville group of Pike County
- Payson group of Adams County
- Quincy group of Adams County
- Lima group of Adams County

Certain orchardists who now have washing and packing facilities have not been included in any group because their own individual crops are sufficient to justify maintenance of their present equipment. In other cases, growers with washers have been included because it was felt that they could benefit by joining in the operation of a cooperative shed.

A number of orchardists within the area studied have not been placed in any group because of their rather isolated geographic locations. Such individuals have a choice of several alternatives: (1) They might adjust their cultural practices, particularly their spray program, so as to comply with the legal spray-residue tolerance without having to wash their apples; (2) they might install a washer through cooperation with a few similarly situated neighbors who could not afford individually-owned washers; and (3) they might select and affiliate themselves with whichever of the special groups appears nearest or most desirable to the individual concerned.

Each of the several suggested groups covers the minimum area and volume it appeared logical to combine into one group. 8/ Growers concerned may care to draw the boundary lines somewhat differently or even to recombine certain of the areas into fewer and larger ones. In the final analysis, of course, growers themselves must and should take the initiative and the responsibility for any joint action upon which they may decide.

Southern Section, Calhoun County

The southern section of Calhoun County had three sheds equipped with washers, two being grower's sheds of which one was not operated in 1935. The third shed, located at Golden Eagle, was operated as a custom shed in 1935. The growers without washing equipment who desired to wash took their fruit to Golden Eagle, Grafton, Hatchtown or East Hardin. Should washing be practiced generally the sheds outside the southern area cannot be relied upon to handle any of the fruit produced in this section. Additional washing machinery with a capacity of 172,000 bushels for the "peak period volume" is needed to care for the crop produced in this area (table 13). This means an equivalent of five lines each handling 1,600 bushels per day throughout the "peak volume period".

8/ The minimum volume desirable for a season's operation was from 90,000 to 110,000 bushels of apples, based on the experience of operators of packing sheds in other midwestern areas.

Table 13. - Analysis of southern section, Calhoun County,
1935-1936 data

	Interviewed growers		Uninter- viewed growers	Total
	With washers	No washers		
Orchardists in section. number	2	45	140	187
Total acreage in orchard. acres	169	2,159	2,840	5,168
Number of orchards by sizes:				
4 to 20 acres. number	0	19	93	112
21 to 40 acres. do	0	11	34	45
41 to 80 acres. do	1	7	9	17
Over 80 acres. do	1	8	4	13
Percentage of trees by age groups:				
1 to 9 years. percent	19.4	31.1		30.8
10 to 24 years. do	50.4	62.6		63.1
Over 24 years. do	30.2	6.3		6.1
Percentage of trees by marketing season:				
Early. percent	16.4	13.2		13.7
Early winter. do	61.9	47.9		49.9
Late winter. do	21.7	36.4		36.4
1935 production. bushels	20,465	246,671	^{1/} 306,077	573,213
"Peak period volume". do ^{2/}	5,703	94,452	111,505	211,660
Capacity of washers. do ^{3/}	21,000		^{4/} 18,900	39,900
Excess capacity. do	15,297			
Deficient capacity. do				171,760

^{1/} Estimated; assumed same bushels per acre in orchard as average for all interviewed in the county.

^{2/} Crop of Jonathan, Grimes, Delicious and Golden Delicious, estimated from total crop according to following formulae:

a. For interviewed growers:

Their total crop X $\frac{\text{bearing age trees, these four varieties}}{\text{bearing age trees, all varieties.}}$

b. For uninterviewed persons:

Orchard acreage, such persons, X $\frac{\text{peak volume crop, interviewed persons}}{\text{orchard acreage, interviewed persons}^*}$

* Entire county, except in Calhoun, where north, center and south sections are used.

^{3/} Twenty-one day period; practical capacity assumed to be one-half the capacity rating per 10-hour day given by the manufacturer.

^{4/} Commercial.

The potential production of the orchards of the area probably will be maintained or increased somewhat, as 31 percent of the trees were below bearing age, while only six percent were over 24 years old. However, the adverse weather conditions of the past few seasons may have lowered the productivity of the mature orchards and have shortened the life of the trees.

Since the total volume represented by the acreage of the 167 operators in this group is so large, the organization of even two sheds might be justified.

Considering the location of the highways and of the orchards, Golden Eagle appears to be the preferred location for a shed to serve the area, especially so if the anticipated highway development is completed and brings about the reduction of the ferry rate to a point where it is comparable to that charged by other ferries (figure 2).

Central Section, Calhoun County

The central part of Calhoun County was more liberally supplied with washing facilities than the rest of the county, having nine grower-owned sheds, two buyer-owned sheds, one custom packing shed, and one cooperative shed each equipped with washers (table 14).

The area had a "peak period volume" of 357,000 bushels to be passed through sheds other than those owned by growers. The capacity of the nongrower-owned sheds available for the "peak period volume" was 92,000 bushels, leaving a total of 265,000 bushels uncared for.

In 1935, slightly over 142,000 bushels went to Missouri by ferry at West Point. At present (1937), a commercial shed and three grower-owned sheds located in the vicinity of Batchtown have a combined practical operating capacity approximately equal to this quantity. The remainder of the washing equipment in this area should be concentrated at Hardin where nearly two-thirds of the volume leaves the county.

Northern Section, Calhoun County :

In the northern section of Calhoun County, there were three grower-owned washers, all on the Mississippi side. There are no other sheds in this area (table 15).

Table 14. - Analysis of central section, Calhoun County;
1935-1936 data

	Interviewed growers With washers	No washers	Uninter- viewed growers	Total
Orchardists in section. . . . number	9	57	187	253
Total acreage in orchard. . . acres	1,041	2,767	4,622	8,430
Number of orchards, by sizes:				
4 to 20 acres. number	0	12	110	122
21 to 40 acres. do	1	17	47	65
41 to 80 acres. do	6	22	25	53
Over 80 acres do	2	6	5	13
Percentage of trees by age groups:				
1 to 9 years. percent	13.0	29.3		24.4
10 to 24 years. do	77.4	64.2		68.2
Over 24 years do	9.6	6.5		7.4
Percentage of trees by marketing season:				
Early percent	7.9	11.7		10.6
Early winter. do	47.8	53.3		51.8
Late winter do	44.3	35.0		37.6
1935 production bushels	120,927	350,652	<u>1/</u> 573,128	1,044,707
"Peak period volume". do <u>2/</u>	58,178	146,831	254,118	459,127
Capacity of washers do <u>3/</u>	101,850	4/92,400		194,250
Excess capacity do	43,672			
Deficient capacity. do				264,877

1/ See footnote 1, table 13.

2/ See footnote 2, table 13.

3/ See footnote 3, table 13.

4/ Four washers: commercial, buyer's and cooperative.

APPROXIMATE LOCATION AND EXTENT OF COMMERCIAL APPLE ORCHARDS
IN CALHOUN COUNTY, 1936

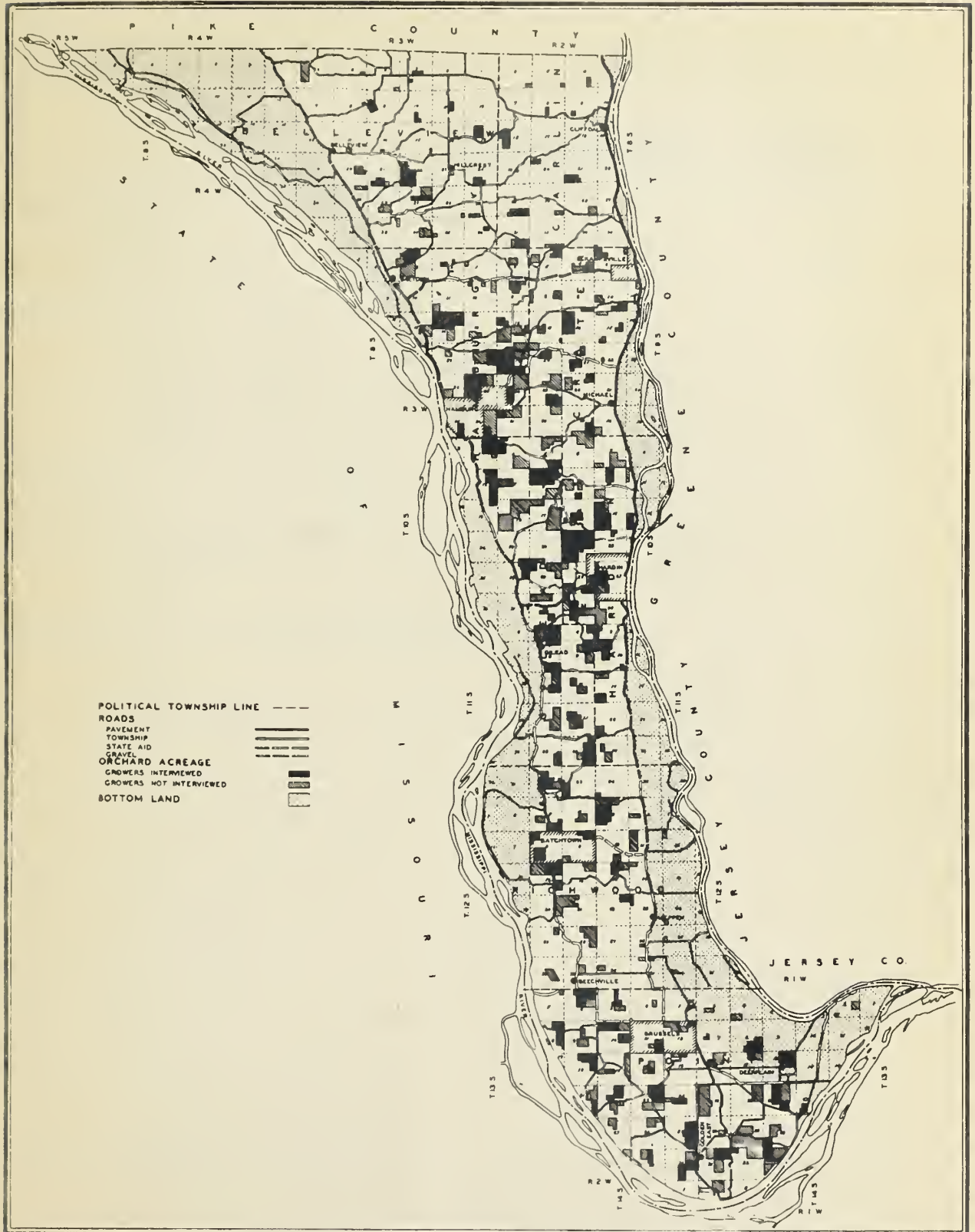


FIGURE 2. - Growers interviewed in total had about the same acreage in orchard as did those not interviewed. In general, the lowland areas, between the rivers and the upland bluffs, are used for growing grain.

Table 15. - Analysis of Northern Section, Calhoun County, 1935-1936 Data

	Interviewed growers		Uninterviewed growers	Total
	With washers	No washers		
Number of growers	3	63	168	234
Acres in orchard, total.	177	2,736	2,968	5,881
Number of orchards by size:				
4 to 20 acres.	0	14	129	143
21 to 40 "	1	23	25	49
41 to 80 "	2	21	11	34
Over 80 "	0	5	3	8
Percentage of trees by age groups:				
1 to 9 years	23.2	14.5		19.8
10 to 24 "	58.7	77.2		71.6
Over 24 "	18.1	8.3		8.6
Percentage of trees by marketing season:				
Early	22.5	11.0		11.6
Early winter.	40.5	51.5		50.9
Late winter	37.0	11.0		37.5
1935 production, bushels	39,000	394,803	1/442,158	875,961
"Peak period volume", bushels 2/	11,973	181,609	197,339	390,921
Capacity of washer, bushels 3/	37,800	0	0	37,800
Excess capacity, bushels	25,827			
Deficient capacity, bushels		181,609	197,339	353,121

1/ See footnote 1, table 13.

2/ See footnote 2, table 13.

3/ See footnote 3, table 13.

The total production in this section for 1935 was 876,000 bushels with a "peak period volume" of 391,000 bushels (table 15). The crop movement data showed that 100,000 bushels left the county by way of the ferry at Hamburg and north by way of Atlas in 1935 (table 9). Washing equipment with sufficient capacity to supply this latter volume might well be maintained on the Mississippi side. The three grower sheds now located on the Mississippi side have sufficient capacity to wash the volume which may be expected to leave the county at Hamburg and north by way of Atlas. Should the growers of the area organize, it would prove more economical for this volume to go through one centralized shed.

The crop movement data also showed 68,000 bushels crossing the Illinois River at Kampsville and it is reasonable to assume that some volume will move north by way of Pearl. The possibility of locating a washer at Kampsville should be considered. The remaining volume according to market outlets used in 1935, should logically move to Hardin.

This section of the county cannot expect an increase in production as 9 percent of the total number of trees were over 24 years old, while only 20 percent were below bearing age.

East Hardin Group, Jersey County

A small group of growers with 462 acres of orchard in the northwestern part of Jersey County were without washing facilities (table 16). The total production in 1935 was 46,000 bushels, not sufficient for economical operation of a cooperative shed. It would appear, therefore, that this group should send their fruit to Hardin, rather than to attempt to establish a shed to handle only their own volume.

Approximately 50 percent of the total crop will pass through a shed during the "peak volume period" or at the average rate of 1,000 bushels a day. The late season volume will be comparatively light. This group can expect a considerable increase in total production within the next few years as 44 percent of the trees were below bearing age, while less than 4 percent were over 24 years old.

Grafton Group, Jersey County

A group of 23 growers with a total production of 128,000 bushels in 1935, located in the vicinity of Grafton, were without washing facilities, save for the cooperative shed at Grafton (table 17). A number of growers were members of the association operating this shed, but the volume of members' fruit passing through the shed has not been sufficient to make economical operation possible.

Table 16. - Analysis of East Hardin group suggested; 1935 - 1936 Data

	Interviewed growers	Uninterviewed growers	Total
Number of growers	9	2	11
Acres in orchard, total	350	112.5	462.5
Number of orchards by size:			
4 to 20 acres	5	0	5
21 to 40 " 	1	1	2
41 to 80 " 	2	1	3
Over 80 " 	1	0	1
Percentage of trees by age group:			
1 to 9 years	44.0		
10 to 24 " 	52.7		
Over 24 " 	3.3		
Percentage of trees, by marketing season:			
Early	5.0		
Early Winter	59.0		
Late Winter	36.0		
1935 Production, bushels	34,850	<u>1</u> /11,204	46,054
"Peak period volume", bushels <u>2</u> /	15,596	6,019	21,615
Capacity of washers, bushels <u>3</u> /	0	0	0

1/ See footnote 1, table 13.

2/ See footnote 2, table 13.

3/ See footnote 3, table 13.

Table 17. - Analysis of Grafton group suggested; 1935 - 1936 Data

	Interviewed growers	Uninterviewed growers	Total
Number of growers	16	7	23
Acres in orchard, total	837	189	1,026
Number of orchards by size:			
4 to 20 acres	5	5	10
21 to 40 " 	4	1	5
41 to 80 " 	4	1	5
Over 80 " 	3	0	3
Percentage of trees, by age groups:			
1 to 9 years	29.8		
10 to 24 " 	61.7		
Over 24 " 	8.5		
Percentage of trees, by marketing season:			
Early	11.0		
Early Winter	49.0		
Late Winter	40.0		
1935 Production, bushels:	103,641	<u>1</u> /24,381	128,022
"Peak period volume", bushels <u>2</u> /.	41,042	10,112	51,154
Capacity of washer <u>3</u> /, bushels.....		<u>4</u> /31,500	31,500
Washer "Peak period volume" deficit, bushels			19,654

1/ See footnote 1, table 13.

2/ See footnote 2, table 13.

3/ See footnote 3, table 13.

4/ Cooperative.

Custom packing has been practiced, with the result that a considerable volume has been drawn from Calhoun County. This volume presumably would no longer be available if nearby facilities were adequate and the Golden Eagle ferry rates should be reduced.

The Grafton group should organize to make the local facilities permanently available to them. Their volume would be sufficient for efficient operation of the Grafton shed equipment and during the "peak volume period" the shed would be loaded to capacity with the prospective 51,000 bushels to pass through the shed in 21 days.

The production will be maintained or even increased within the next 10 years, as 30 percent of the trees were below bearing age, while 8 percent of the trees were over 24 years old.

Jerseyville Group, Jersey County

In the vicinity of Jerseyville there were 14 orchardists, with a total of 746 acres of orchard, without washing facilities (table 18). Their combined 1935 production was 75,000 bushels. A number of the orchards in the 10- to 24-year group were not in full production or did not produce a crop in 1935, yet these trees were vigorous enough to be productive. The vigor of the trees, the fact that 12 percent of the total trees were below bearing age, and the absence of trees over 24 years old indicate that the production will be maintained for some years.

The early varieties were relatively unimportant, accounting for only 7 percent of the total number of trees, while 62 percent were of early winter and 30 percent of late winter varieties. Thus, the volume can be expected to be heavy early in the fall and relatively light late in the season.

Jerseyville appears to be the best location for a washing and packing shed; however, the volume as indicated by the 1935 crop was too low for the most effective operation. There is a grower-owned washing and packing shed of good size in Jerseyville, which might handle a proportion or all of the volume of the group if arrangements to this effect could be made with the owner.

Patterson Group, Green County

In Patterson Township and surrounding area there were 25 growers with a total of 675 acres of orchard who had no available washing facilities (table 19). The total production in 1935 was 97,000 bushels

Table 13. - Analysis of Jerseyville group suggested;
1935 - 1936 Data

	Interviewed growers	Uninterviewed growers	Total
Number of growers	9	5	14
Acres in orchard, total.....	314	432	746
Number of orchards by size:			
4 to 20 acres	3	2	5
21 to 40 " 	4	0	4
41 to 80 " 	2	2	4
Over 80 " 	0	1	1
Percentage of trees by age groups:			
1 to 9 years	12.0		
10 to 24 " 	88.0		
Over 24 " 	0.0		
Percentage of trees, by marketing season:			
Early	7.2		
Early Winter	62.3		
Late Winter	30.5		
1935 Production, bushels	19,210	<u>1</u> /55,728	74,938
"Peak period volume", bushels <u>2</u> /..	12,390	23,112	35,502
Capacity of washer, bushels <u>3</u> / ...	0	0	0

1/ See footnote 1, table 13.

2/ See footnote 2, table 13.

3/ See footnote 3, table 13.

Table 19. - Analysis of Patterson Township group suggested; 1935 - 1936 Data

	Interviewed growers	Uninterviewed growers	Total
Number of growers	13	12	25
Acres in orchard, total	531	144	675
Number of orchards by size:			
4 to 20 acres	5	10	15
21 to 40 " 	5	1	6
41 to 80 " 	2	1	3
Over 80 " 	1	0	1
Percentage of trees by age group:			
1 to 9 years	3.1		
10 to 24 " 	85.7		
Over 24 " 	11.2		
Percentage of trees by marketing season:			
Early7		
Early Winter	61.6		
Late Winter	37.7		
1935 Production, bushels	73,251	<u>1</u> /23,904	97,155
"Peak period volume", bushels <u>2</u> / ...	17,949	16,173	34,122
Capacity of washers, bushels <u>3</u> /	0	0	0

1/ See footnote 1, table 13.

2/ See footnote 2, table 13.

3/ See footnote 3, table 13.

of which 34,000 fell in the "peak period volume". This is barely sufficient volume for efficient and economical operation of a cooperative washing and packing shed. The volume would pass through the shed at a fairly uniform rate throughout the packing season, since the "peak period volume" requires machinery of about the same capacity as is required to care for the total crop. Drake appears to be the best location from the standpoint of available rail and truck transportation facilities. However, the total production for this group can be expected to decrease rapidly after a few years as only 3 percent of the total number of trees were below bearing age, and 11 percent were over 24 years old.

Nebo Group, Pike County

A small number of growers south of Nebo, with a total of 200 acres, were without washing facilities. Their total volume was not sufficient to operate a cooperative shed economically. At times a portion of the crop has moved from here to Valley City, where it was prepared for market. The total crop in 1935 was approximately 27,000 bushels of which about 9,500 bushels fell in the "peak volume period" (table 20).

The production for this group can be considered now at a peak as only 8 percent of the trees were below bearing age at the time of the survey. In this group 17 percent of the trees were of early varieties (table 20) a higher percentage than that for the area as a whole.

The market outlet was largely through wholesale channels; therefore, the group could well consider the possibility of uniting with some other group. As another possibility, an individual orchardist might install a washer of sufficient capacity to care for the combined crop on a custom basis; the high unit costs resulting from the low volume might be offset by the cost of hauling these apples to a more distant washer.

Summer Hill Group, Pike County

In the vicinity of Summer Hill were located six orchardists with a combined total of 345 acres of orchard (table 21). There was one grower-owned washer among them, approximately the right size to care for its owner's crop in years of heavy yield. Another orchardist dusted instead of spraying and might not find it necessary to wash. However, if all the crop were to be pooled, the volume would be about two-thirds that needed for efficient operation of a cooperative shed. The total volume can be expected to increase some during the next few years as 43 percent of the trees were below bearing age and there were no trees over 24 years old.

Table 20. - Analysis of Nebo group suggested; 1935 - 1936 Data

	Interviewed growers,	Uninterviewed growers	Total
Number of growers	3	3	6
Acres in orchard, total.....	175	34	209
Number of orchards by size:			
4 to 20 acres	1	3	4
21 to 40 " 	1	0	1
41 to 80 " 	0	0	0
Over 80 " 	1	0	1
Percentage of trees by age groups:			
1 to 9 years	8.0		
10 to 24 " 	88.9		
Over 24 " 	3.1		
Percentage of trees by marketing season:			
Early	17.3		
Early Winter	40.9		
Late Winter	41.8		
1935 Production, bushels	20,000	<u>1</u> /6,936	26,936
"Peak period volume", bushels <u>2</u> /	6,260	3,213	9,473
Capacity of washers, bushels <u>3</u> /	0	0	0

1/ See footnote 1, table 13.

2/ See footnote 2, table 13.

3/ See footnote 3, table 13.

Table 21. - Analysis of Summer Hill group suggested; 1935 - 1936 Data

	Interviewed Growers		Uninterviewed growers	Total
	With washers	No washers		
Number of growers	1	4	1	6
Acres in orchard, total	80	235	30	345
Number of orchards by size:				
4 to 20 acres	0	0	0	0
21 to 40 " 	0	1	1	2
41 to 80 " 	1	2	0	3
Over 80 " 	0	1	0	1
Percentage of trees by age groups:				
1 to 9 years	35.1	48.9		43.2
10 to 24 " 	64.9	51.1		56.8
Over 24 " 	0	0		0
Percentage of trees by marketing season:				
Early	0.	3.5		2.6
Early Winter	58.1	75.9		71.3
Late Winter	41.9	20.6		26.1
1935 Production, bushels	20,000	41,100	<u>1</u> /6,120	67,220
"Peak period volume", bushels <u>2</u> /.	8,160	21,290	2,835	32,285
Capacity of washer <u>3</u> /	8,400	0	0	8,400
Excess capacity	240			
Washer "Peak period volume", deficit		21,050	2,835	23,885

1/ See footnote 1, table 13.

2/ See footnote 2, table 13.

3/ See footnote 3, table 13.

It would seem advisable for this group to combine with another group in order to obtain more volume. They might unite with a group at Nebo or Barry as one possibility.

Barry Group, Pike County

In the vicinity of Barry were 12 orchardists with 721 acres of apples (table 22). Their 1935 crop amounted to about 180,000 bushels. This was sufficient volume to operate a cooperative shed to very good advantage. The "peak period volume" was 86,000 bushels, which left a relatively light volume for the latter part of the season. The early varieties accounted for 16 percent of the total trees. The percentage of trees below bearing age (26 percent) was sufficient to maintain the present production; only 6 percent of the trees were over 24 years old.

The washers owned and operated by two of the growers of this group, with a combined practical operating volume of 31,500 bushels during the "peak volume period" had less than half the capacity necessary to care for the combined crop of these growers. The crop of at least one of the two growers owning washers would need to be included in the group in order to obtain sufficient volume to operate economically a cooperative washing and packing shed. If neither of the growers equipped with washers should care to cooperate, the rest of the group might draw volume from growers of the Summer Hill or Nebo group.

Many of the growers making up this group sell a portion or all of their crop at retail. However, complete enforcement of the State spray-residue law will make washing just as essential for fruit so marketed as for fruit sold and moved into interstate commerce. This fact will have a bearing upon the area which it is possible for a cooperative shed to serve, growers taking their fruit home from the shed to be sold at retail would not care to haul as far as growers who sold their crop at wholesale at the shed. Also growers selling at retail would require packing services different from those of growers selling at wholesale.

Griggsville Group, Pike County

In the concentrated apple section of Griggsville and Valley City were orchardists holding a total of 830 acres of orchard without washing facilities (table 23). With a total production like that of 1935, 197,000 bushels, this group should experience no difficulty in securing sufficient volume for economical operation of a cooperative washing and packing shed.

Table 22. - Analysis of Barry group suggested; 1935 - 1936 Data

	Interviewed Growers		Uninterviewed Growers	Total
	With Washers	No washers		
Number of growers	2	9	1	12
Acres in orchard, total	330	341	50	721
Number of orchards by size:				
4 to 20 acres	0	5	0	5
21 to 40 " 	0	2	0	2
41 to 80 " 	0	0	1	1
Over 80 " 	2	2	0	4
Percentage of trees by age groups:				
1 to 9 years	17.7	34.0		26.0
10 to 24 " 	71.6	64.5		68.0
Over 24 " 	10.7	1.5		6.0
Percentage of trees by marketing season:				
Early	22.8	9.1		15.7
Early Winter	48.3	70.4		59.7
Late Winter	28.9	20.5		24.6
1935 Production, bushels ...	124,000	47,000	1/8,800	179,800
"Peak period volume", bushels 2/	45,384	36,143	4,725	86,252
Capacity of washers 3/ bushels	31,500	0	0	31,500
Washer "Peak period volume" deficit bushels	13,884	36,143	4,725	54,752

1/ See footnote 1, table 13.

2/ See footnote 2, table 13.

3/ See footnote 3, table 13.

Table 23. - Analysis of Griggsville group suggested; 1935 - 1936 Data

	Interviewed growers	Uninterviewed growers	Total
Number of growers	12	4	16
Acres in orchard, total.....	635	195	830
Number of orchards by size:			
4 to 20 acres	4	1	5
21 to 40 "	0	1	1
41 to 80 "	6	1	7
Over 80 "	2	1	3
Percentage of trees by age groups:			
1 to 9 years	2.4		
10 to 24 "	95.3		
Over 24 "	2.3		
Percentage of trees by marketing season:			
Early	6.9		
Early Winter	49.2		
Late Winter	43.9		
1935 Production, bushels	15,175	<u>1</u> /39,780	196,955
"Peak period volume", bushels <u>2</u> / ...	75,140	18,428	93,568
Capacity of washers, bushels <u>3</u> /	0	0	0

1/ See footnote 1, table 13.

2/ See footnote 2, table 13.

3/ See footnote 3, table 13.

In 1936, a few Griggsville growers in this group were sending their fruit through a grower-owned shed located at Valley City. It may be that they would not be interested in a cooperative shed, but even excluding their volume, there should remain sufficient volume for efficient operation of a cooperative shed. However, it is well to note that the total production for this group can be expected to decrease rapidly after 8 or 10 years, since less than 3 percent of the total trees were below bearing age--barely enough to balance an equal percentage over 24 years old.

Griggsville would seem to be the most logical location for a shed. The majority of the fruit can be expected to move to market by truck as Griggsville is on paved roads. This is important in attracting truck buyers. Should a shed be located at Pittsfield, a number of the growers from the Griggsville group would be likely to send apples there; even so, the remaining growers in the Griggsville group would have volume adequate for a cooperative shed.

Payson Group, Adams County

A total of 31 growers in the vicinity of Payson had no available washing facilities (table 24). Their combined orchard holdings totaled 429 acres with a total production in 1935 of about 61,700 bushels. This group may expect their production to increase rapidly during the next few years as 62 percent of the total number of trees are below bearing age and any development undertaken should have sufficient flexibility to allow future adjustment to this increase in volume. The fact that 84 percent of the trees were of the early winter group indicates that a shed might be taxed to capacity to handle the "peak period volume" but would have a light run before and after this period.

Table 24. - Analysis of Payson group suggested; 1935 - 1936 Data

	Interviewed growers	Uninterviewed growers	Total
Number of growers	6	25	31
Acres in orchard, total	211	218	429
Number of orchards by size:			
4 to 20 acres	4	22	27
21 to 40 "	1	2	3
41 to 80 "	0	0	0
Over 80 "	1	0	1
Percentage of trees by age groups:			
1 to 9 years	61.7		
10 to 24 "	23.7		
Over 24 "	14.6		
Percentage of trees by marketing season:			
Early	1.1		
Early Winter	84.4		
Late Winter	14.5		
1935 Production, bushels	23,390	1/38,368	61,758
"Peak period volume", bushels 2/	10,354	17,658	28,012
Capacity of washers, bushels 3/	0	0	0

1/ See footnote 1, table 13.

2/ See footnote 2, table 13.

3/ See footnote 3, table 13.

With the prospect of greatly increasing production and with the knowledge that the "peak period volume" will become a larger portion of the total crop 9/, it would not be advisable to establish a shed with capacity limited to present needs. Although the 1935 volume was not sufficient for economical operation of a cooperative shed, the group would be justified in organizing and establishing a shed considering the large percentage of their trees just coming into bearing.

Quincy Group, Adams County

There were 40 growers in the Quincy area with a total of 746 acres of apple orchard (table 25). The total production in 1935 was 146,000 bushels. The area was at a rather stable point in production with 20 percent of the total number of trees below bearing age against 31 percent over 24 years old (table 25).

The growers produced sufficient volume for the efficient operation of a cooperative washing and packing shed, with a "peak period volume" for the group of 91,500 bushels. One grower in the group owns a washer with a practical operating capacity during the "peak period volume" of 10,500 bushels, leaving 81,000 bushels without washing facilities. This is sufficient volume for two washers each handling 2,000 bushels per 10-hour day.

Quincy is the largest consuming center immediately within the western Illinois apple area and in the vicinity is a well-developed truck gardening area. Several of the truck growers grow fruits of various kinds including apples. This helps to account for the many small growers represented in the group. This large consuming center makes a good retail outlet for many of the growers including some of the larger ones. Therefore, a cooperative shed to serve the area will need to consider ways of serving both the men who retail and those who wholesale.

9/ 39.2 percent of the trees of "peak period volume" varieties are less than bearing age in Adams County whereas, only 7.8 percent of the early varieties and 15.9 percent of the late winter varieties are of such age.

Table 25. - Analysis of Quincy group suggested; 1935 - 1936 Data

	Interviewed Growers		Uninterviewed growers	Total
	With washers	No washers		
Number of growers	1	15	24	40
Acres in orchard, total	60	503.5	183	746.5
Number of orchards by size:				
4 to 20 acres	0	6	23	29
21 to 40 " 	0	7	1	8
41 to 80 " 	1	1	0	2
Over 80 " 	0	1	0	1
Percentage of trees by age groups:				
1 to 9 years	0.0	22.1		19.8
10 to 24 " 	37.5	50.7		49.3
Over 24 " 	62.5	27.2		30.9
Percentage of trees by marketing season:				
Early	7.6	6.9		6.2
Early Winter	87.3	80.9		76.3
Late Winter	5.1	12.2		17.5
1935 Production, bushels	15,000	98,800	<u>1</u> /32,200	146,000
"Peak period volume", bushels <u>2</u> /	13,035	63,627	14,823	91,485
Capacity of washer <u>3</u> / bushels...	10,500	0	0	10,500
Deficient capacity, bushels	2,535	63,627	14,823	80,985

1/ See footnote 1, table 13.

2/ See footnote 2, table 13.

3/ See footnote 3, table 13.

Lima Group, Adams County

In the northwest part of Adams County in the vicinity of Lima, there were 15 growers with a total of 320 acres of apple trees. The total production in 1935 was 43,500 bushels, with a "peak period volume" of 14,200 bushels. Production is apt to increase some during the next few years; 39 percent of the total number of trees are below bearing age against 24 percent over 24 years old (table 26).

The volume represented by the group is not sufficient under normal conditions to justify a cooperative washing and packing shed. This group, however, having a large local retail trade, might expect of the cooperative shed only a washing service, in which case the expenses could be very greatly reduced. Under such conditions, the group may be justified in locating a shed centrally at Lima rather than to haul their fruit to Quincy for washing and back home again for retail selling at the farm.

Various Degrees of Cooperation Possible for any Group

With respect to each of the several foregoing groups suggested, it should be pointed out that the growers may choose any one of several degrees of cooperation in their washing, packing and marketing operations. They may cooperate:

1. To wash apples, only;
2. To wash, grade and pack apples;
3. To wash, grade and pack, and also to sell locally through their own salesman; or
4. To wash, to grade and pack according to standards similar to those used by other local cooperative groups, (preferably based on Federal-State inspection) and to sell their apples through a centralized cooperative sales agency serving the several local groups.

As an additional activity these local associations might purchase supplies for their members. However, in areas already conveniently served by a purchasing association affiliated with a county farm bureau, it would probably be to the advantage of the members to purchase through the one organization rather than through their several local associations.

Table 26. - Analysis of Lima group suggested; 1935 - 1936 Data

	Interviewed growers	Uninterviewed growers	Total
Number of growers	4	11	15
Acres in orchard, total	223	97	320
Number of orchards by size:			
4 to 20 acres	0	10	10
21 to 40 acres	1	1	2
41 to 80 " 	3	0	3
Over 80 " 	0	0	0
Percentage of trees by age groups:			
1 to 9 years	39.1		
10 to 24 " 	36.4		
Over 24 " 	24.5		
Percentage of trees by marketing season:			
Early	5.8		
Early Winter	39.7		
Late Winter	54.5		
1935 Productionbushels	26,350	1/17,170	43,520
"Peak period volume".....bushels <u>2/</u>	6,377	7,857	14,234
Capacity of washersbushels <u>3/</u>	0	0	0

1/ See footnote 1, table 13.

2/ See footnote 2, table 13.

3/ See footnote 3, table 13.

Before developing any new cooperative association of course, the local group should carefully consider its needs in relation to facilities and give serious consideration to the desirability of affiliating with other cooperative groups, if any such are already in the field.

First Steps in Establishing a Cooperative Organization

For counsel and assistance in organizing and setting up new cooperative associations, growers can turn to one or more of the following: their county farm adviser, the Illinois State Department of Agriculture, the Extension Service of the College of Agriculture, the Illinois Agricultural Association, the Illinois Fruit Growers Exchange, and the Cooperative Division of the Farm Credit Administration.

If and when any group of growers decides to cooperate, their first step should be to select and appoint an organization committee of five or more growers. According to the will of the group, this committee would then proceed in one of two ways, namely:

1. The committee could draw up a rather complete plan of organization, operation and financing, and on the basis of this plan secure growers' signatures signifying their willingness to cooperate. After obtaining sufficient evidence of potential support, the committee could proceed to incorporate the association according to their plan; or
2. The committee could be entrusted with the authority and responsibility, from the start, to carry through the details of incorporation and formulation of plans for operation and financing. Then with the organization legally set up, the committee could solicit membership and the organization could begin to function.

In either event, whether soliciting membership after formation of the association or getting promises of cooperation if the association were to be formed, the committee should handle the following details for the group:

1. Outline the scope of activities of the organization.
2. Analyze the membership and tonnage possibilities.
3. Determine a workable method of financing.
4. Formulate the articles of incorporation and bylaws.
5. Take the necessary steps to accomplish incorporation.
6. Develop membership agreements or contracts between the member and the association.
7. Solicit membership.

In case several local groups decide to organize about the same time, then it would be highly desirable for representatives of each group to meet together in one committee for the purpose of simplifying and standardizing the set-up of each group. Such procedure also would be of great assistance in the event that the several groups should then or later choose to combine their output for centralized selling.

Sales Outlets Employed

Growers in this area are very much in need of an impartial news service to assist them in bargaining intelligently with dealers and particularly with merchant-truckers. At present (1937) each grower deals as an individual independent of all other growers. Quotations are available to them only in delayed fashion through newspaper accounts of the St. Louis market. It is not very difficult for a dealer to convince some growers that others are selling cheaper than they are, and thus manipulate a decline in price. A Federal-State market news service to operate through the busy harvest months in this area would be of great benefit to the producers.

Disposition of the 1935 crop by interviewed growers showed that, for the area as a whole, nearly one-third (32 percent) of the apples moved through commission houses on consignment (table 27). About one-half as many (16 percent) were sold by the growers themselves on the market. Roughly similar amounts were sold at the farm or packing shed both to wholesale buyers and to truckers. Sales to cider mills took almost one-tenth (9 percent) of the crop.

Calhoun County is clearly more of a wholesale territory than the rest of the area. In Calhoun County, the growers sold only six percent of the crop on the markets and through local retail sales, whereas in the rest of the area they sold 30 percent in this manner (table 27). The proportion of the Calhoun County crop that went to the cider mills was twice as large as that of any other county. More of the Calhoun County crop remained unsold than of the crops of the other counties.

A separate analysis of sales by Calhoun growers according to the number of acres in orchard shows that growers with acreages over 80 sold 32 percent of their 1935 crop through commission men or brokers, 24 percent to truckers and 12 percent to cider mills; less than three percent remained unsold. Growers with 20 acres or less sold 16 percent through commission men, 25 percent to truckers and 22 percent to cider mills; 14 percent remained unsold. Although Calhoun growers in the largest acreage group stored the highest proportion of their crop (37 percent) none of their apples were sold by the storage houses. Growers having 41-80 acres in orchard

Table 27. - Disposition of 1935 apple crop by 313 western Illinois growers interviewed 1/

Disposition	Quantity			Percentage of crop		
	Calhoun County	Rest of area	Total area	Calhoun County	Rest of area	Total area
	<u>Bushels</u>	<u>Bushels</u>	<u>Bushels</u>	<u>Percent</u>	<u>Percent</u>	<u>Percent</u>
Commission men and brokers <u>2/</u>	312,831	546,794	859,625	27.1	35.6	31.9
Growers on market <u>3/</u>	52,692	372,486	425,178	4.6	24.2	15.8
Wholesale buyers in producing area <u>4/</u>	236,182	174,240	410,422	20.4	11.3	15.2
Truckers	202,948	174,677	377,625	17.6	11.4	14.0
Sales to cider mills	161,141	92,884	254,025	14.0	6.0	9.4
Sold through cooperative association.	56,082	45,724	101,806	4.8	3.0	3.9
Local retail sales	12,450	86,806	99,256	1.0	5.7	3.8
Sales by storage	40,303	13,725	54,028	3.5	0.9	2.0
Relief agencies <u>5/</u>	4,303	13,450	17,753	0.4	0.9	0.6
Waste; not sold.	76,177	15,190	91,367	6.6	1.0	3.4
All outlets	1,155,109	1,535,976	2,691,085	100.0	100.0	100.0

1/ 177 growers in Calhoun County; 136 growers in six other counties, namely; Adams, Brown, Green, Jersey, Pike and Scott.

2/ Brokerage sales were negligible.

3/ Includes sales to preserve manufacturers, wholesale trade, stores, etc.

4/ Includes sales to pie bakers, wholesale produce concerns, etc.

5/ Surplus Commodity Purchasing Section of Agricultural Adjustment Administration, in conjunction with the Illinois Emergency Relief Commission.

sold 27 percent of their crop to wholesale buyers in the producing area, and it was from orchards of this size that these wholesale buyers purchased 57 percent of the amount they bought from growers interviewed; growers of this acre-group sold only 12 percent of their crop to truckers.

Nineteen marketing agencies, such as commission men and brokers, were interviewed in St. Louis, Chicago, Springfield, and Jacksonville. Of the 1,211, 696 bushels of western Illinois apples they handled during the 1935-1936 season, one-half was received on consignment or handled on a brokerage basis, over one-third (37 percent) was bought outright from growers, and the balance (13 percent) was produced in the firms' own orchards. Of the volume handled by the 11 firms visited in St. Louis, 71 percent was handled on consignment, 22 percent was made up of outright purchases and the balance came from the companies' own orchards.

Inasmuch as 1935 was a bumper crop year, it is probably true that in other years, the marketing agencies would buy outright considerably more than 37 percent of their volume. Marketing agencies usually let the grower carry all risks up to harvest even when buying outright; however, about eight percent of the volume so purchased in 1935 was bought on the trees and the buyer took the risks from the time of sale until harvest.

Almost invariably, the charge for commission sales was 10 percent, and in most cases a 10-cent minimum charge per basket was made. Brokerage charges varied from 5 to 10 cents per bushel. Farm prices paid for outright purchases by St. Louis wholesale houses in 1935 ranged from about 50 cents per hundred pounds for tree-run quality to 75 and 80 cents per bushel for No. 1 quality, late varieties. Commission men and wholesale houses usually sold their apples in their home city to local retail merchants, trucker-peddlers or hucksters and pie bakers. Occasionally the distribution radius was from 40 to 100 miles around the market, especially in Chicago. A very few concerns did a considerable car-lot sales business to more distant points. Unfortunately, exact distribution figures for western Illinois apples were not segregated in the dealers' records.

As indicated previously in this report, grower sales to truckers were one of the more important outlets for apples, particularly for the heavy 1935 crop. At the time of the survey (1936) relatively few truckers were operating in the area, because of the shorter crop and higher prices. Thirty-four individuals buying and hauling apples away by truck were interviewed in 1936. These men came from different points in Illinois at distances from 40 to 150 miles, from 15 points in Missouri,

and from one point in Arkansas. The apples were obtained sometimes directly from farmers at their farms or orchards but usually at the large packing sheds. The shorter the crop, the more they confined their source of supply to the shed.

Nineteen of these 34 men had operated in the same territory during the 1935-1936 season and bought 47,250 bushels, mostly ungraded. Fifteen of the truckers were in this area for the first time and a few of them were in their first year of apple buying. They paid from 15 to 50 cents per bushel for Utility grade apples in 1935, with the average at about 25 cents.

As can be seen from table 28, most of these truckers were supplying a very definite trade and therefore could in no sense be considered itinerant truckers as far as their sales outlets are concerned.

Table 28 - Purpose for which 34 trucker-buyers were buying apples in the area studied; Fall of 1936

Type of trade supplies	Number of operators
Wholesale customers, such as storekeepers. . .	9 <u>1</u> /
Own general produce store.	7 <u>1</u> /
City retail customers.	7 <u>2</u> /
Own roadside markets	4 <u>1</u> /
Rural retail customers; farm to farm peddling.	3
Own use and for neighbors.	3
Own cider press.	<u>1</u>
Total.	34

1/ Includes one orchardist.

2/ Includes two orchardists.

It is interesting to note that five of these operators also were orchardists who, because of a short crop in 1936, were buying apples in order to keep their regular customers supplied. Homemade apple butter appears to be a fairly important item for Missouri housewives both urban and rural, as six Missouri truckers mentioned that much of their volume was being used by their customers for this product. Those buying for "own use and for neighbors" were farmers or truckers who had brought grain, livestock or coal into the vicinity of this area and who were taking apples back on the return trip.

Pie companies frequently purchased Willow Twig apples at harvest time to supply their needs from late winter through July. This variety is used late in the season because of its exceptional storage qualities and desirability for making pies. The companies' grade requirements, which are somewhat similar to the Utility grade, are: 2-1/4-inch minimum, no blemishes which will not pare away (maximum 1/16-inch deep) but no color requirement. Frequently the companies accept the apples at the grader, and pack the fruit "jumble pack" in secondhand containers without liners so as to reduce costs to the minimum. Western Illinois is the only area in the country producing Willow Twig apples commercially and growers, therefore, should attempt to develop this outlet. The importance of the variety within this area cannot be expected to increase soon as only 15 percent of the trees were below bearing age.

Sales of growers' apples by cold-storage concerns did not represent an important outlet in 1935-36. Generally, the sales service of the concern was limited to the acts of showing the prospective buyer the lots offered and of making a C.O.D. sale if the buyer's bid equalled the patron's offer. Thus, the service amounted essentially to that of a broker. Sales usually could be made on oral authority, though a few concerns required written authority from the grower. Six of the 19 concerns interviewed made no sales. Where much selling was done, it represented a competitive practice intended to bring a larger volume of storage business to the plant, since in all cases but one, the sales were made without charge to the grower. In a very few instances the sales were forced by the storage concern in order to protect the loan and storage charges accumulated against the lot stored.

Byproducts

Cider Vinegar

Growers' sales to cider and vinegar plants are of special interest in that they dispose of lower-grade fruit without placing it on the fresh-apple market in competition with fruit seeking a premium for quality.

The volume of Calhoun County apples used for cider ^{10/} has varied from 59,000 to 235,000 bushels from 1928 to 1935, inclusive (figure 3).

In 1935, there were six independent cider mills in Calhoun County making cider for sale for conversion into vinegar and doing custom work for farmers. According to the estimates of the cider mill operators, the cider made amounted to somewhat over a million gallons. This represented (at a ratio of 12.5 pounds of apples to the gallon of cider) nearly 13,000,000 pounds or somewhat over 250,000 bushels of apples. Part of the apples so used at Hardin may have come from Jersey County. Four of the Calhoun mills were supplying cider for vinegar to large cider-vinegar companies in Alton, Ill., and St. Louis, Mo. About 3,500 gallons of the cider was made as custom work for farmers at 2 cents a gallon, or \$1.00 per 50-gallon barrel. About 35,000 gallons was sold as cider and the remainder went into vinegar.

In addition to the cider made in Calhoun County, over 10 million pounds of apples were converted into some 650,000 gallons of cider by plants in the rest of the area or in nearby counties. In the plants interviewed throughout the entire area, nearly 25 million pounds, or over 500,000 bushels of apples were used for cider or vinegar.

Because of the large crop and low prices in 1935, a larger than usual proportion of good-quality apples went into cider. Most of the sales of apples for cider were made at from 15 to 20 cents per 100 pounds, delivered to the mill. The cider vinegar market is relatively small and is dominated by the highly competitive and cheaper "white" or distilled vinegar market. It was asserted by some of the large operators that serious competition from eastern and western points is invited whenever midwestern vinegar prices rise above 16 cents per gallon delivered midwestern points. This is equivalent to about 40 cents per 100 pounds for apples to the farmers.

^{10/} Comparable data are not available for the other counties studied.

Because of irregularly recurring years of high and low production of apples in the Middlewest, the cider vinegar manufacturers make and store in large-crop, low-price years an oversupply of vinegar as high as 40 percent to carry them well along into the short years.

Cider mills require for a gallon of cider from 11 to 16 pounds of apples, depending upon their efficiency. A yield of 1 gallon from 12.5 pounds of fruit is considered desirable 11/. The pomace is used as cattle feed in the West but is not so used in the area studied. A good cider vinegar plant capable of handling about 9,000,000 pounds of fruit per season would cost in the neighborhood of \$40,000 and would require for operating capital approximately \$25,000. The cider vinegar field appears well occupied in this territory.

Apple Chop

Another apple product possibility for this territory is "apple chop". This is the whole apple cut up and dried till its final weight is from one-fifth to one-seventh its original weight. It is used primarily in the manufacture of apple butter. The cleanliness and quality of the chops used affects the quality of the apple butter. Chop most desired by some apple butter manufacturers has a moisture content of about 22 percent.

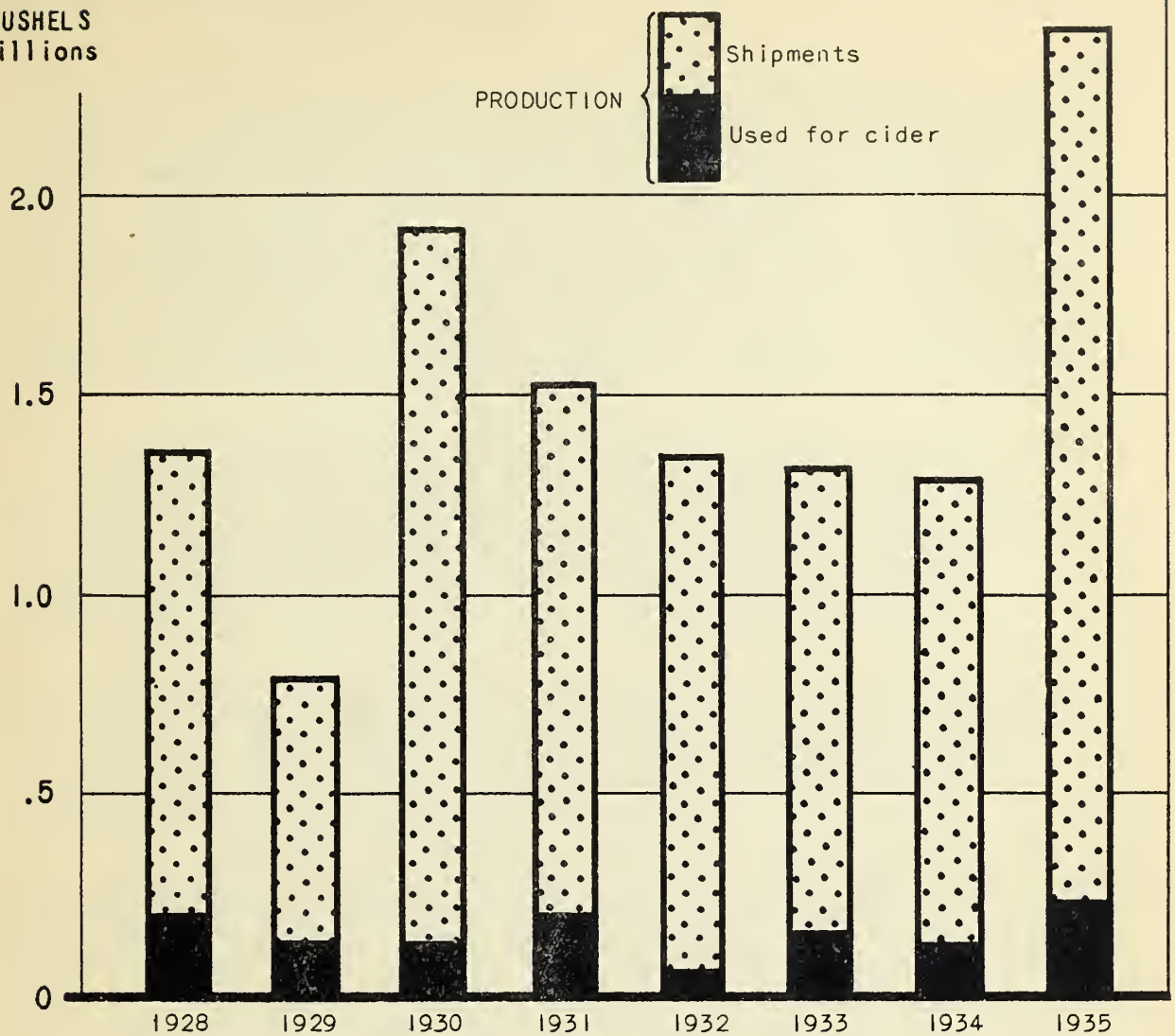
Three manufacturers of apple butter, preserves, and other products in St. Louis, Mo., were interviewed. These firms together use roughly 2,000,000 pounds of apple chop per year; the equivalent of about 290,000 bushels of fresh apples, assuming a seven to one reduction in weight. Private sources indicate that probably this amount is not over half that used in Illinois and bordering States. There are no apple-chop plants in or near the area studied, so that these apple-butter manufacturers must get most of their supply from the far West and from eastern States. Freight rates to St. Louis for chop are slightly less than 1 cent per pound from the northwest and about 1/2 cent from eastern territory.

According to information obtained from several private sources, it costs from 1 to 3 cents per pound, not including the cost of the fresh fruit, to make a pound of apple chop. The product has been sold over the past 5 years for from 4 to about 9 cents per pound delivered in St. Louis. Assuming a manufacturing cost of 2 cents, a selling

11/ Cruess, W. V. "Fruit Juices and Fruit Juice Beverages", College of Agriculture, University of California, Berkeley, Calif. - Experiment Station Circular 313, 1932.

COMMERCIAL SHIPMENTS AND QUANTITY USED FOR CIDER

BUSHEL
Millions



PROPORTION USED FOR CIDER

PERCENT

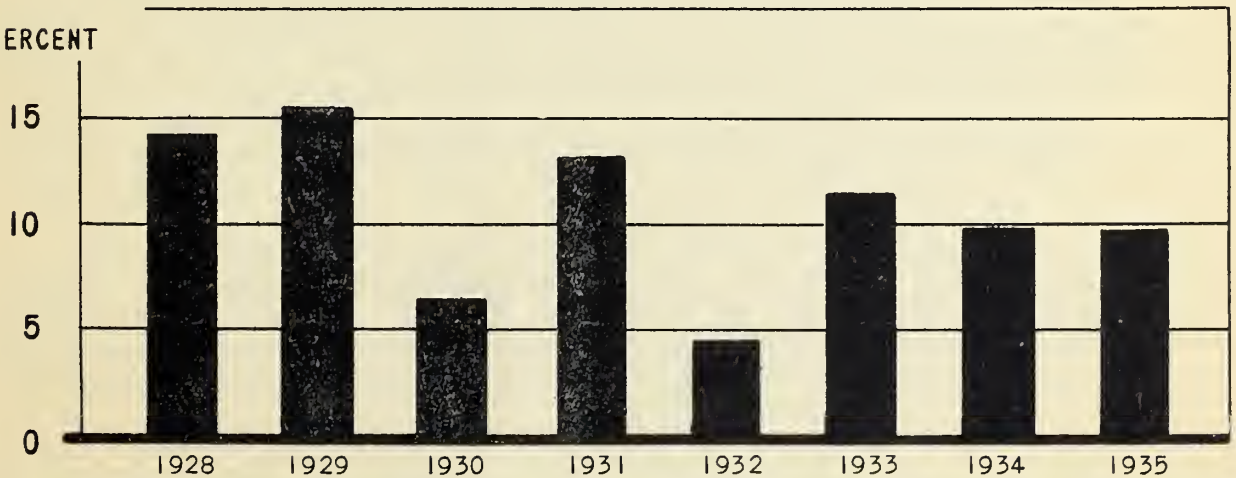


FIGURE 3. - Commercial shipments of apples, and proportion used for cider, Calhoun County, Illinois; 1928 - 1935. (Based on data obtained by the Division of Standardization and Markets, Illinois Department of Agriculture).

expense of 1/2 cent and a selling price of 5 cents per pound of chop, a gross margin of 2.5 cents would be available out of which payments could be made for the fresh apples used. If 7 pounds of apples were required to make the 1 pound of chop, then this would be the equivalent of 35.7 cents per 100 pounds or 17 cents per bushel. In 1935, the cider mills which bought most of the low-quality apples paid about 20 cents per 100 pounds, and in 1936, about 40 cents. If the apple-chop concern could not sell all its production immediately, it would have additional expense for storage, which unless offset by a seasonal rise in selling prices would lower the price which could be paid for the fresh apples.

In the foregoing example, the price per pound of chop was assumed to be only 5 cents--in order to be quite conservative. However, inasmuch as the actual midwestern price has gone up at times to as high as 8 or 9 cents a pound, it is only fair to point out that each cent per pound increase in the assumed selling price of the chop means 14.3 cents per 100 pounds that could be paid the grower for fresh fruit.

These prices assume that the full net profit from the operations would be returned to the growers, through grower ownership and control of the plant. Under private ownership, however, probably at least 2 to 5 cents per 100 pounds of fresh fruit would be deducted from the grower's price, to pay a profit to the owners.

An apple-chop plant and equipment to handle 30,000 to 40,000 bushels of fresh fruit in 80 days would cost about \$5,000. Units can be combined with increasing efficiency in relation to cost, so that a plant to handle 200,000 bushels in the same period should not cost more than \$20,000. A plant of this size would make about 1,400,000 pounds of chop. Hardin would be the logical location for it, if one were built in the area.

Probably the operators would find it necessary to pay the growers at least 30 cents per 100 pounds upon delivery of their fruit to the plant with any balance (if cooperative) to be paid at the close of the season. Since the buyers of chop often do not complete their purchases till about the end of the February following harvest, such advances to growers would require about \$30,000 of capital. Additional working capital to cover the season's operating cost of about \$28,000 would also be needed.

This preliminary survey indicates sufficient possibilities to warrant additional and more detailed study by the growers themselves before taking final action. In such a study, special attention should be directed toward determining what, if any, peculiar technical and managerial skills are necessary for the operation of such a plant.

Such a chop factory might well be established and operated by an independent concern. Probably it should be undertaken as a cooperative venture only after growers have had several years of experience in successful cooperation in other activities such as washing, packing and marketing; in such a case, ownership of the factory should be held by several local cooperative associations rather than directly by the individual growers.

Storage

Within a very limited time after washing, grading and packing, apples must either be consumed or moved into storage. During the 1935-36 season nearly two-thirds (63 percent) of the growers interviewed in Calhoun County placed part of their apples in cold storage; only half of those in the other six counties studied did likewise. The greater opportunities for sale at retail or to truckers in the outlying counties probably explain this difference. In the seven counties combined, part of the crop was stored by 58 percent of the growers interviewed.

Almost one-third of the crop (32 percent) in the entire area was stored by growers in 1935. The proportion of the crop that was stored depended partly upon the sales outlets immediately after harvest and partly upon the acres in orchard. For example: In Calhoun County the proportion of the crop stored increased from 10 percent for growers with orchards 1 to 20 acres in size to 37 percent for orchards larger than 80 acres. The percentage of growers who stored increased even more rapidly (table 29).

Consistent with this relationship is the fact that in the six counties with an average size of orchard of about 66 acres per interviewed grower, growers stored 34 percent of their crop on the average; whereas, in Calhoun County, with an average size of orchard of 50 acres per interviewed grower, the growers stored 29 percent of their crop.

Present facilities for apple storage within reasonable distances from the western Illinois area appear to be fully adequate to the needs of the industry according to records from 19 cold-storage operators. In St. Louis and East St. Louis, located near the area in question and having excellent transportation facilities to other points, approximately 500,000 bushels of apples could have been stored in addition to the large quantity actually stored there in 1935. Additional available apple storage space in other cities such as Chicago and Peoria, Illinois, and Hannibal, Missouri, in the 1935-36 season amounted to well over 2,000,000 bushels.

Table 29. - Percentage of 1935 crop stored in relation to size of orchard, based on survey records in Calhoun County

Acres per orchard	Total number of growers interviewed	Total 1935 crop, bushels	Percentage of growers who stored	Percentage of crop which was stored
1-20.	43	77,405	40	10
21-40	50	231,437	64	28
41-80	61	443,321	69	27
Over 80	23	397,946	91	37
All sizes	177	1,155,109	63	29

The actual amount of space available for apple storage at any one time depends primarily upon the volume of certain other commodities in storage, such as eggs and meats, which ordinarily produce more income for the storage concern. Storage men were quite unanimous in their assertion that the rates charged for apples stored did not equal the cost of the storage, but merely served to partially offset the overhead costs on otherwise unused space. Apple storage rates per month usually are arranged on a declining scale, with the first month's charge including the usual 5 cents per bushel handling charge. The first month's charge for storing western Illinois apples in the 1935-36 season ranged from 9 to 11 cents per bushel basket. The second month rate varied from 4 to 6 cents and the third month rate ran from 3 to 6 cents. Since Illinois apples ordinarily are not stored longer than 6 months, storage concerns normally quote a season rate, as well as monthly rates, which covers storage until April first. After this date, a reasonably high monthly rate is charged to encourage movement out of storage. In the 1935-36 season, storage holdings of apples were so abnormally large and market conditions were so adverse that the storage concerns by common consent extended the storage season to May first at no increase in the season rate.

These seasonal rates sometimes offered a saving to the patron, but more often were merely equivalent to the accumulated monthly charges for six months. In the markets studied, season rates varied from 19 to 30 cents per bushel basket, with the average at about 22-1/2 cents. Some storage concerns varied the rate charged according to volume with a scale of rates which had a variation of 1 to 10 cents per bushel. Rates for a round-bottomed bushel basket were the same as for a bushel tub (flat-bottomed basket) but were from 2 to 3 cents greater than the season rate for apples in the western box, because boxes can be stacked more easily and compactly than either bushel tubs or baskets.

ORGANIZATION

Local Interest in Cooperation

As has been pointed out previously, many of the handling costs encountered in the marketing of apples from this section in 1935-36 seem excessive in relation to the value of the crop. Taking the crop from the time it was grown until the apples were sold out of storage, growers in Calhoun County reported the following ranges in cash expenses per bushel:

<u>Operation</u>	<u>Expense (cents)</u>
Picking, per crate	0 - 5
Trucking from orchard to packing shed	0 - 10
Custom packing for those packed out	27 - 27
Trucking, Hardin to storage	10 - 10
Storage, season rate	19 - 30
Trucking, out of storage	0 - 5
Selling commission	0 - 10 (10 percent if sold above \$1)
<hr/>	
Total	56 - 97

Thus, the cash outlay for the handling of a bushel of apples from the time they are ready to be picked from the tree until they are sold out of storage is from 56 to 97 cents per bushel. The 56-cent a bushel expense was possible only in those cases where the family picked and hauled the apples to the shed without making a charge, and where the storage rendered the sales service free to their patrons, and there was no charge for removal from storage. Growers should study ways of reducing these costs. Such a large cash outlay to pack, store and sell apples has caused many growers to prefer to sell their crop bulk at comparatively low prices or adopt some other inexpensive method of marketing.

With the thought that cooperative effort might possibly provide the solution to some of the growers' washing, grading, and marketing problems, each grower was asked concerning both his suggestions for improving the marketing situation and his attitude toward cooperation. Only 9 percent of the growers interviewed were satisfied with present facilities and services for washing and marketing (table 30). Need for additional washing and packing facilities was felt by 45 percent of the growers, and for additional marketing services by 60 percent. Forty percent of the growers wanted any additional facilities and services to be cooperative, while another 29 percent had no preference

Table 30. - Need for additional washing, packing and marketing facilities as expressed by 313 fruit growers in western Illinois 1/, 1936

Growers' comments	Number of growers commenting			Percentage of all growers interviewed		
	Calhoun County	Other counties	Total	Calhoun County	Other counties	Total
Additional facilities or services needed for:						
Washing and packing.	75	66	141	42	49	45
Marketing.	110	78	188	62	57	60
Preferred facilities and services to be						
Cooperative.	70	56	126	39	41	40
Independent.	37	30	67	21	22	22
Either (neutral)	58	34	92	33	25	29
Satisfied with present facilities and services	12	16	28	7	12	9
Total of growers interviewed <u>2/</u>	177	136	313	100	100	100

1/ Adams, Brown, Calhoun, Greene, Jersey, Pike and Scott Counties.

2/ Some growers made several comments.

between cooperative and independent operation. Among those interviewed it appeared that as large a proportion of growers favored cooperation in Calhoun County as in the rest of the area.

Growers have already made significant beginnings in cooperation. As indicated later in this report 12/, about half of the growers interviewed were buying their supplies directly through a cooperative association, and other growers were getting supplies indirectly as part of the services of a cooperative washing and packing shed. On the other hand, nearly two-thirds of the growers included in the study were still packing their own fruit (largely without washing) and only 12 percent were using a cooperative shed (table 31). This situation is due to several factors, among which are: (1) lack of general agreement among growers as to what constitutes a U.S. No. 1 pack, (2) individualistic habits and methods of sale, (3) inadequacy and inaccessibility of cooperative sheds, (4) the ability to sell apples without spray-residue removal because of incomplete enforcement of spray-residue regulations, and (5) desire of small producers to pack at home and use home labor.

Forty-eight percent of the growers were members of county farm bureaus or supply companies sponsored by the farm bureau, and nine percent were members of other cooperative organizations, such as cooperative creameries or cooperative elevator associations. An additional indication of the growers' attitude toward cooperation is the fact that two-thirds were making some use of spray-schedule advice of the College of Agriculture and the State Department of Agriculture. Similarly, nearly two-thirds attended local orchard meetings for help in production practices (table 31).

Opinions of men in the produce trade, cold-storage operators, bankers, and other nonfarmers interviewed all concurred in the view that growers in this section seriously needed to improve and standardize grades and pack in order to win favor and higher prices for their fruit, and for the most part indicated that this could be brought about only through cooperation.

Cooperative Organizations Now Serving Orchardists in Area

Only two local associations of any size, the Calhoun County Farm Bureau Exchange at Hardin and the Adams County Shippers' Association at Quincy, were handling orchard supplies cooperatively in this area at the time of the study. The Calhoun County organization also operated a washing and packing shed, largely on a custom-work basis, allowing each grower to dictate his own style of grade and pack. This organization also operated a sales department in St. Louis for a portion of the 1935-36 season to sell apples for members, primarily those indebted to the association for supplies and services.

12/ See under "Purchasing", page 80.

Table 31. - Cooperative activity (other than purchasing) of 313 fruit growers in western Illinois ^{1/};
1935-36 marketing season

Activity engaged in	Number of growers			Percentage of all growers interviewed		
	Calhoun County	Other counties	Total area	Calhoun County	Other counties	Total area
Packing operation						
Using cooperative shed.	32	7	39	18	5	12
Packing own fruit	117	88	205	66	65	65
Membership in cooperatives						
Farm Bureau	99	50	149	56	37	48
Other organizations	5	23	28	3	17	9
Making some use of spray schedule advice of college and State agencies	121	89	210	68	65	67
Attendance at local orchard meetings .	117	80	197	66	59	63
Total of growers interviewed	177	136	313	100	100	100

^{1/} Adams, Brown, Calhoun, Greene, Jersey, Pike and Scott Counties

The Grafton Fruit Growers Association also had a washing and packing shed which was operated largely as a custom packing shed. Its membership was drawn from Jersey County, but it did custom packing also for a considerable number of growers in the southern part of Calhoun County. The association was a member of the Illinois Fruit Growers Exchange having headquarters at Carbondale, and therefore, members of the Grafton association were entitled to use the sales service of the Exchange.

The Illinois Fruit Growers Exchange is a centralized cooperative sales agency serving member-producers of a variety of fruit in Illinois. At present most of the members who produce apples are drawn from the southern Illinois early apple area. The sales are made on a brokerage basis and at distant points are accomplished through brokerage representatives of the National Fruit and Vegetable Exchange (national cooperative sales agency) wherever available. Up until the time the product goes into storage, the Exchange has allowed the grower to choose whether or not sale of his product shall be made at the specific prices offered. Sales to a buyer at a distance may be made on the basis of Federal inspection. Local trucker-buyers make their own inspection. If no prices offered are satisfactory to the grower, and if he elects to place his fruit in storage, the Exchange assumes sole discretion as to when and for how much it shall be sold. In the past, returns have been on an individual rather than a pooled basis because growers have not had a uniform, standardized grade and pack. Affiliated with the Exchange is the Fruit Exchange Supply Company, through which members thereof (not necessarily members of the Exchange) may buy fertilizer, insecticides, baskets, etc.

For cooperative credit for fruit production, growers may turn to the Illinois Fruit Growers Production Credit Association, located at Centralia, Illinois. For cooperative credit for general production purposes, there are available the three cooperative Production Credit Associations located at Pittsfield, Jacksonville, and Carlinville. 13/

If unassisted, orchardists in the western Illinois area studied may have serious difficulty in raising the capital necessary for the construction and operation of cooperative washing and packing facilities.

Cooperative groups in this area which are interested in obtaining loans may apply to the Regional Bank for Cooperatives at St. Louis for assistance along each of three lines, namely: (1) Physical facility loans, (2) Operating capital loans, and (3) Commodity loans. This bank, in common with other regional banks for cooperatives, may lend to worthy cooperatives up to 60 percent of the value of collateral offered to secure a loan for the purchase, building, lease, or refinancing of physical facilities to be used by the association. The collateral offered is

13/ See also the discussion of these associations under "Credit", page 73.

usually a mortgage upon the property itself. The loan would be repaid as quickly as possible over a period of years by a series of installments occurring at least once a year. The interest rate charged on facility loans may change according to conditions at the time the loan is made, but the rate in March 1937 was 4 percent. Such loans are made self-liquidating by the usual provision for payments out of a definite retain set aside on each unit of the commodity handled. The bank makes such loans only when the cost, purchase, or lease price of the facilities are considered reasonable; and it is the usual policy to require that growers themselves pay a substantial amount toward ownership of their facilities. An original capital contribution could be arranged on the basis of a certain amount per bushel or per acre in apple orchards to accumulate at least 40 percent of the total capital requirements.

Banks for cooperatives also are permitted to make loans for operating capital to supplement the funds which growers themselves provide for carrying on the business of their cooperative association up to the end of a particular marketing season. Such loans must be safely secured by liens on real estate equipment, inventories, commodities, accounts receivable, notes, or other items. In March 1937 the interest rate on such loans was 3 percent.

The banks also may make available a commodity loan upon the following special conditions: (1) Each loan shall be secured by a first lien on farm products or farm supplies, approved by the Cooperative Bank Commissioner and of sufficient value (as determined by the bank) at the time the loan is made to afford an adequate margin of security without the necessity for additional collateral of other kinds. Liens for accrued storage or warehouse charges and taxes not yet due are not considered prior liens, provided the bank is satisfied that adequate arrangements have been made to assure the payment of such charges when same become due and payable; (2) The loan shall mature within the normal marketing period of the commodities securing the loan; (3) The proceeds of the loan shall not be used for the construction or acquisition by purchase or lease of physical facilities, or for refinancing the cost of construction or acquisition of such facilities; and (4) Such loans shall not be made on changing stocks of goods ¹⁴/₁. This latter type of credit would be most useful to an association which was selling its members' fruit out of storage; reasonable advances to members could be made on such stored fruit before sales were completed, and such advances would be similar to those which many storage companies have made to individual growers in the past at a 6 percent interest rate. To get such a loan from the bank, the association would have to show ownership of the fruit through definite marketing contracts and would have the fruit stored in the name of the association.

¹⁴/₁ From the Fourth Annual Report of the Farm Credit Administration, 1936, page 60.

"Commodity loans are made for periods required for normal, seasonal operations of the borrowing associations and ordinarily mature in from 3 to 9 months. Where the security and other conditions justify, renewals may be granted at maturity.

"The basis upon which loans are made depends upon the character, quality, and marketability of the collateral offered, the management and financial condition of the association, and other factors.

"The interest rate on commodity loans at present (September 1936) is 2 percent a year. This conforms to the prevailing interest rate on commodity loans charged borrowers from the Federal intermediate credit banks."

15/

CREDIT

Businessmen, representatives of spray material and basket manufacturers, and local bankers in the area often stated that many growers had largely exhausted their credit and financially were in serious circumstances. On the other hand, the opinion was often expressed that growers had received as much credit from local sources as they were entitled to receive from any lending agency requiring adequate security for its loans. Manufacturers of spray materials have continued to do business with financially embarrassed growers by obtaining, through their local representatives, a personal understanding with each individual whereby the grower agrees to satisfy that particular company's claim when his crop is sold.

Cold-storage companies loaned on apples stored in their warehouses with the warehouse receipt and the grower's personal note as security, and collected their loans before the grower received any proceeds from the sale of his stored apples. The credit in most cases was not available until the crops were in storage and the grower who used this source had to finance himself elsewhere until his crop was harvested and stored.

The data obtained from growers showed that a large part of the operations were on credit extended by dealers in the form of supplies, and by operators of cold-storage houses. Only 46 out of 313 growers, or 15 percent, acknowledged difficulty in obtaining dealer-credit. Dealer-credit was used by 231 growers, or by nearly three-fourths of those interviewed. For 155 growers, (about half of those interviewed, or two-thirds of those using dealer-credit), dealer-credit was the only form used (table 32).

In 1935, these dealers were unable to collect many of their outstanding accounts, thus tying up their operating funds and largely forcing the independent supply dealers as a class, to operate on a cash basis or not at all.

In parts of the area spray material companies have established warehouses. Each grower is given a financial rating and can purchase materials on credit up to the amount of the rating given. The spray companies frequently place greater importance on the grower's morale and the possibility of the orchard making a profit than do most lending agencies.

Growers outside Calhoun County, having easier access to local markets, apparently suffered less than those in Calhoun County during the conomic depression - as reflected in their use of credit. Thus, 30 percent of the growers interviewed outside Calhoun County used no credit; whereas, only 13 percent of those in Calhoun County were in this position. About 19 percent of those in Calhoun County had difficulty in obtaining dealer-credit, while only 10 percent of those in the other counties had such difficulty. Likewise, Calhoun growers used somewhat less bank credit and considerably more storage-house credit,

proportionately, than did growers in the other counties. A few growers in each section were receiving credit from as many as four different sources at the same time.

Table 32. - Use of credit by 177 apple growers in Calhoun County and 136 apple growers in six other western Illinois counties 1/ 1935-36 marketing season

Item	Calhoun County		Other counties		Total area	
	Number of interviewed growers	Percentage of growers interviewed	Number of interviewed growers	Percentage of growers interviewed	Number of interviewed growers	Percentage of growers interviewed
Using no credit of any kind.....	23	13	41	30	64	20
Using supply-dealer credit	147	83	84	62	231	74
Using supply-dealer credit only.....	90	51	65	48	155	50
Having difficulty getting dealer credit	33	19	13	10	46	15
Using credit from banks...	11	6	19	14	30	10
Using credit from cold-storage concerns.....	50	28	5	4	55	18
Using credit from other sources.....	10	6	7	5	17	5

1/ Adams, Brown, Greene, Jersey, Pike and Scott Counties.

No attempt was made to determine the amount of mortgage indebtedness nor the total amount of supplies bought on credit. Direct borrowings for production and marketing purposes were ascertained, however, (table 33).

For the entire seven counties, nearly half the total amount of direct loans consisted of those made by cold-storage concerns. Considering Calhoun County alone, cold-storage concerns extended over twice as much direct credit as did the banks.

According to those interviewed, the number of borrowers getting loans from any source was 36 percent of the total number of interviewed growers; whereas, in the other six counties, borrowers were only 21 percent of all growers. However, such borrowers in Calhoun County, on the average, had received loans from these sources totaling only about \$1,200, while outside this county, the average borrower received over \$2,300. These relationships probably are as much the

result of the larger proportion of small-scale orchardists in Calhoun County, compared with the other six counties, as they are of any difference in credit risk.

As might be expected, larger loans were made to borrowers having more acres of orchard (table 34).

Data obtained from 18 cold-storage companies for the 1935-36 season show that they advanced more than \$308,000 on approximately 737,000 bushels out of the total 1,579,000 bushels of Illinois apples they stored. This is an average of more than 40 cents per bushel advanced on the 46 percent of the Illinois apples stored. Though many growers did not realize they were paying interest, the storage concerns were charging 6 and sometimes 7 percent interest per annum on these loans.

Table 33. - Reported amount of credit used, exclusive of dealer credit, by 313 western Illinois growers in the 1935-36 season 1/

Source of credit	Calhoun County			Six other counties			Total		
	Number of accounts			Number of accounts			Number of accounts		
	Total	Joint 2/	Amount	Total	Joint 2/	Amount	Total	Joint 2/	Amount
Bank loans.....	11	4	\$20,775	19	2	\$34,425	30	6	\$55,200
Advances by cold storages.....	50	8	47,263	5	2	20,750	55	10	68,013
Other sources....	10	5	4,480	7	2	10,025	17	7	14,505
Total.....	71	8	72,518	31	3	65,200	102	11	137,718

1/ Includes only the credit used by those reporting specific amounts. Not considered in this table are farms owned and operated by outside capital, such as farms owned by a commission firm or an insurance company.

2/ These are accounts with growers who were getting credit also from one or more of the other sources listed in the table.

Table 34. - Average amount per loan from different sources for operating capital to apple growers interviewed in seven counties of western Illinois 1/, 1935-36 season.

Source of loan	Average amount of loan on orchards of -				All sizes
	1-20 acres	21-40 acres	41-80 acres	Over 80 acres	
Bank.	\$575	\$433	\$1,058	\$5,429	\$1,840
Cold storage.	168	859	677	3,693	1,237
Other sources	588	656	1,272	633	853
All sources <u>2/</u>	394	706	866	3,660	1,350

1/ Adams, Brown, Calhoun, Greene, Jersey, Pike and Scott

2/ Average amount per loan, regardless of source. The respective average amounts loaned per borrower, from all these sources combined were:

<u>Size of orchard</u>	<u>Amount loaned per borrower</u>
1-20 acres	\$ 415
21-40 acres	918
41-80 acres	965
Over 80 acres	<u>4,473</u>
All sizes	1,513

Advantage of Adequate Credit

Growers who have sufficient credit available at reasonable rates of interest are in a position to give proper care to their orchards through use of fertilizers, proper cultivation and adequate spray equipment. They also are in a position to pay cash to supply dealers and so take advantage of cash discounts when offered. In Calhoun County, approximately 31 percent of the growers interviewed were taking advantage of cash discounts in varying degrees when cash discounts were offered, although these were not generally available. Likewise, in the other six counties, 35 percent of the orchardists were taking cash discounts. A few growers paid cash for supplies as a general policy, even when cash discounts were not granted.

Influence of Credit Source upon Marketing Methods

A further advantage of adequate production credit properly obtained lies in the grower's ability to move his crop when and how he desires. However, agencies lending to orchardists in the area studied seldom exercised such influence over sale of the crop as the terms of the loan often allowed. For instance, although cold-storage concerns usually stipulated that they had the power to sell a patron's fruit to cover the loan and storage charges if market trends jeopardized the loan, they seldom resorted to this expedient.

Other Potential Sources of Production Credit

As stated above, a substantial number of the growers were dependent on supply-dealer credit. Also the largest source of cash credit in the area as a whole was the cold-storage agencies which made advances only after the crop was in storage. If the supply houses in general should restrict or entirely stop their extension of credit, as has been done already by some concerns in the area, many growers would be placed in a difficult position. Other potential sources of credit are banks, production credit associations and marketing agencies.

In 1933, the Illinois Fruit Growers Production Credit Association, located at Centralia, Ill., was organized to serve the fruit growers of the State of Illinois. Loans by this association to orchardists in the area studied were almost nonexistent. Inasmuch as the survey revealed that almost all of the orchardists lacked information as to the existence and possibilities of this cooperative credit organization, a brief discussion of certain of its features may be useful here.

This specialized organization making loans to fruit growers in Illinois is, like all other production credit associations, a cooperative undertaking by and for the farmer-borrowers. Each borrower owns stock in the association to the extent of \$5 per \$100 (or fraction thereof) borrowed, and has a voice in the election of its directors. The loan committee of this association at Centralia has decided to limit consideration of loan applications to a minimum of \$500. The money is advanced on a budget basis, as needed, and the borrower pays no interest on the unused part of his loan. Furthermore, he may at any time repay part or all of the loan and stop the interest on the part repaid. The reasonable costs of the loan are low in comparison with the often-concealed cost of dealer credit.

A farmer applying for a loan from a production credit association is asked to pay an inspection fee to cover the cost of inspecting his property and the merits of his application. Also, he must pay for a chattel abstract which indicates whether or not the property he is offering is free of liens. The association usually requires a first mortgage on the crop as well as on stock and equipment. Also, in many cases it requires "nondisturbance" agreements from other creditors, not only to secure the repayment of the loan, but also - and primarily - to

prevent other creditors of the borrower from embarrassing him by trying to "close in" on his property. For each grower a definite budget is set up covering his costs and no loan will be made unless the situation warrants a loan large enough to permit him to grow fruit properly. Advances from this loan are made to the grower at intervals according to his requirements.

Possession of any cash credit puts the grower in a position to pay cash and take a cash discount where allowed, thus lowering his production costs. A grower to whom cash discounts are available can compare such savings with the cost of a production credit loan. Such a loan offers the further advantage of adequate funds for a good job of orcharding.

Loans for less than \$500 to finance fruit production can be made by the local production credit associations that primarily make general-purpose and livestock loans. Such loans to orchardists interviewed were negligible in number and amount. The counties in the area are served as follows:

<u>Name of Production</u> <u>Credit Association</u>	<u>Headquarters</u>	<u>Counties</u> <u>Served</u>
Mississippi Valley . . .	PittsfieldAdams, Brown Calhoun, Pike
Jacksonville	JacksonvilleScott
Carlinville.	Carlinville.Greene, Jersey

Marketing agencies can advance credit for production purposes on a conservative basis without undue risk, provided they confine their advances to a definite budget for needed purposes, refuse credit to growers who would not follow good practice, and use a contract or agreement which assures them of the handling of the crop and also gives them a prior claim over other creditors. If this type of financing is connected with a supply house, the credit loss could be considered as a part of the cost of doing business with those to whom credit is extended. Such supply houses should give cash discounts to persons who can get cash credit in order that the cost of extending credit will be borne by those who use it.

Emergency crop loans for amounts up to \$400 can be obtained from the Emergency Crop Loan Office at St. Louis by growers who do not have other sources of credit. A first mortgage on the crop would be required.

For purposes of determining the proper size of a loan for fruit production, it should be recognized that growers with the smaller acreages employ unpaid family labor almost exclusively so that their cash costs up to harvest are limited to materials such as fertilizer and spray material. On the other hand, growers with larger acreages must hire some additional help and so have higher cash costs. A comparison of estimated preharvest cash expenses of a small orchard

Table 35. - Estimated preharvest cash expenses of caring for a 20-acre and an 80-acre orchard 1/

Item	Cost per acre	Cost for 20-acre orchard	Cost for 80-acre orchard
Material:			
Six sprays <u>2/</u>	\$9.18	\$183.60	\$734.40
Bands, three feet per tree.	1.20	24.00	96.00
Fertilizer, five lbs. per tree.	3.50	70.00	280.00
Total cost of materials.	13.88	277.60	1,110.40
Labor and power:			
Pruning	3.52		281.60
Spraying.	9.09		727.20
Mowing.	2.04		163.20
Discing	2.10		168.00
Banding	2.50		200.00
Applying fertilizer75		60.00
Total cost of labor and power.	20.00	100.00 <u>3/</u>	1,600.00
Total preharvest expenses.	33.88	377.60	2,710.40

1/ Estimates based on trees 16-18 years old and 40 trees to an acre. Minimum spray schedule with formulae and rate of application recommended in Circular 447, Directions for Spraying Fruits in Illinois, Agricultural Experiment Station, University of Illinois, in cooperation with the Illinois State Natural History Survey. Prices computed on 1936 level. Labor rates per hour: man 25 cents, team 20 cents, tractor (10-20) 25 cents.

2/ Dormant, pre-pink, cluster bud, calyx, and two cover.

3/ If all family labor, and if power expense assumed, \$100.

enterprise with a large one is shown in table 35.

It appears from this table that labor costs even more than materials for the preharvest expense of the growers with large acreages. Fixed costs, such as interest and taxes, and new items of equipment do not appear in the preharvest expense since it is normally expected that they will be paid when the crop is sold. Clearly, the commercial fruit grower having as much as 20 acres in orchard is not interested in loans in the neighborhood of \$50 or \$100 if he must borrow to meet a large part of his production costs.

As soon as the harvest season arrives, the grower has additional expenses of harvesting, hauling, washing and packing. Typical harvest expenses per acre in the area (40 trees per acre, average yield 5 bushels per tree) in 1935 were:

Picking, 5 cents per bushel	\$10.00
Delivery to shed, average - 6 cents per bushel.	12.00
Washing and packing at 27 cents per bushel if 80 percent packed	<u>43.20</u>
Total harvesting expense.	65.20

For an orchardist with 80 acres bearing orchard, the harvesting expense therefore, will be over \$5,200 or nearly twice the amount spent up to harvest time. With a crop ready to harvest, a fruit grower is in a better position to get financed. His original production credit loan could have been set up to cover the harvest expenses, if needed; or the production loan could be paid off and advances obtained from a storage company or marketing agency. If growers are organized into a cooperative marketing association, their association might obtain a commodity loan on apples in storage, out of which some advances could be made to growers.

PURCHASE OF SUPPLIES

To date, the most active phase of cooperation among orchardists in the area has been the purchase of supplies. Spray materials were used by 98 percent of the growers interviewed and of this number, 48 percent purchased the materials cooperatively. The others secured materials through local independent dealers, or direct from the spray-material companies or through stock houses established in the area. Many of the independent dealers have given much credit in the past.

Commercial fertilizers were used by 52 percent of the orchardists interviewed (table 36). Others recognized the importance of fertilizers and expressed regret that returns had not been sufficient the last few seasons to make application of fertilizers possible. Cooperative purchasing was practiced by 93 of the 164 growers who used fertilizers during the last two seasons. The others purchased directly from the manufacturers or, more often, through local dealers.

Table 36. - Use and cooperative purchasing of spray materials, fertilizer and baskets by 313 western Illinois apple growers, 1935-1936.

Supplies	Adams County	Brown County	Calhoun County	Greene County	Jersey County	Pike County	Scott County	Total area
Spray materials:								
Number using.	27	3	176	18	45	37	2	308
Number buying cooperatively	24	3	93	0	16	11	2	149
Commercial fertilizers:								
Number using.	12	2	96	8	28	18	0	164
Number buying cooperatively	11	2	62	0	14	4	0	93
Baskets:								
Number using.	23	3	155	11	37	34	4	267
Number buying cooperatively	22	2	67	0	7	9	0	107

Packages were purchased by 267 of the 313 interviewed, of which 107 purchased cooperatively. A number of the growers had their crop washed and packed at sheds where a charge was made to include the package; in such cases, the grower has not been recorded as purchasing packages. Others sold their crops to buyers who washed and packed the crop or to truckers who moved the crop in bulk. Many of the growers had sufficient volume to make purchases by carlots and in these cases purchases direct from the manufacturers were common. Baskets were handled by a few local dealers, who were frequently the source of supply for small growers. Some growers purchased baskets in St. Louis or other cities at the time they delivered apples to market.

The local independent dealers are not nearly so important a source of supplies as formerly and it seems unlikely that they will regain much of the volume lost. Their individual volume is not sufficient to provide economical purchasing and marketing, which makes it possible for large growers (and for small growers with good credit) to purchase more cheaply through other channels. Also, the inability of the independent dealers to advance further credit is curtailing their business.

The economic conditions of the last 7 or 8 years have placed many of the orchardists in poor financial circumstances; in many cases, their regular sources of credit no longer exist. The commercial spray-material companies came to the aid of the growers in some sections through arrangements whereby credit for the spray materials was given by the company, a service much needed by the industry and much appreciated by many of the orchardists.

The regulatory work on spray residue has caused a number of washing and packing sheds to be established in the area. The sheds which do custom packing or its equivalent in most cases make a charge to cover all operations of washing, grading and packing including the cost of the container. The charge is made on packages "packed-out" plus a handling charge on grades not packed. This tends to centralize the purchasing of packages and it appears likely that in the near future a large percentage of the packages will be purchased through the sheds rather than by individual growers.

No cooperative purchasing is done by any of the growers contacted in Greene County; in the remaining counties the number purchasing cooperatively ranged from one-fourth to nine-tenths of those interviewed. Any development toward cooperative washing and packing sheds will encourage cooperative purchasing of supplies.

SUMMARY AND RECOMMENDATIONS

Production of apples is the major source of income for nearly a thousand orchardists located in the counties of Adams, Brown, Calhoun, Greene, Jersey, Pike and Scott, in western Illinois. In a survey of the area, in which 313 apple growers were interviewed, it was found that less than 60 percent of the farm area was in cultivation in 1936, and that more than 50 percent of the cultivated land was in orchard.

Apple production will, no doubt, continue to be a major enterprise in the area. Most of the orchards are located on bluff lands bordering the Illinois and Mississippi rivers. These lands are adapted by soil and topography to orcharding and, in general, to no practical alternative crop. Production may increase somewhat, since 22 percent of the apple trees were below bearing age in 1936 and only 8 percent were over 24 years old, as indicated by the sample. Most of the orchards are in the hands of men of long experience, and over 90 percent of the operators own their orchards.

Early winter varieties, chiefly Jonathan, Grimes, Delicious, and Golden Delicious, are of major importance in this area and, except for Grimes, are becoming relatively more important. In 1936 over 48 percent of the trees of bearing age and 68 percent of those of nonbearing age were of early winter varieties. Of the late winter varieties, Willow Twig is the most important, being second only to Jonathan in total number of trees. While the number of Willow Twig trees probably will be maintained, their relative importance will decline because of the increase in production of early winter varieties.

A large percentage of the fruit produced is of the lower grades and as a rule is not uniformly packed. Growers' estimates indicate that only about 50 percent of the 1935 crop graded U.S. No. 1. Dealers who handle apples from this area made many comments unfavorable to the general reputation of apples from this section. In view of these facts it is recommended that a definite educational program be developed in which all agencies concerned should cooperate to establish uniform grades and packs of the apples produced.

Facilities for washing and packing were found to be altogether inadequate throughout most of the area. Provision of such facilities is complicated by the situation with respect to water supply, which requires that washing facilities be close to a river or a city water system. Since additional facilities are required, the data were examined for indications of the proper location and extent of such plants, based on the potential volume in various parts of the area, on present equipment, on roads and transportation facilities, and on the logical direction of movement of the crop. On the basis of this analysis, it is suggested that additional packing-house facilities be provided where

it has been indicated (see pp. 32-55) that they are needed and most likely to succeed. With proper support from orchardists, these facilities can advantageously be owned and operated by cooperative organizations.

If the fruit is to be marketed cooperatively, the output from each local cooperative shed should be combined with that of the other cooperative sheds and sold by a central or federated cooperative sales agency which might be either an existing organization or a new one. Before initiating any new cooperative enterprise, however, growers should give careful consideration to the desirability of affiliating with any existing cooperative organization which might serve their interests.

The 1935 crop was marketed through a variety of channels. Commission men or brokers handled 32 percent, growers sold 16 percent at wholesale on various markets, and wholesale buyers bought 15 percent in the producing area. Retail sales by growers were unimportant except in the northern part of the area. Sales through cooperatives were also of minor consequence.

The large volume of low-grade fruit was sold in several ways. Sales to cider mills represented 9 percent of the crop; buyers for pie factories bought large quantities of Utility-grade apples in the area; and truckers bought 14 percent of the crop, including a large proportion of lower-grade apples. It is suggested that encouragement be given to the organization by private enterprise of by-product plants in the area to provide better outlets for low-grade fruit. If such private operations do not develop and operate satisfactorily, grower organizations, after gaining experience in working together, might provide their own by-product plants.

Growers in the area studied generally bargain with buyers on an individual basis, concealing their quotations from their neighbors, and competing with each other for sales outlets. Many growers make sales based upon inadequate market information. To overcome this handicap, growers might try to secure the establishment of a Federal-State market news service in the area to collect and disseminate market information in order that all persons buying and selling will have more adequate information. If a separate service proves impracticable, it is suggested that the service at St. Louis might be expanded during the busy harvest months to give greater attention to apple deals in this area.

Growers in 1935 placed in cold storage nearly one-third of their total crop, including many Utility-grade apples. Commercial storage facilities were adequate. Storage rates, in most instances, were considered reasonable.

Supply manufacturers and dealers are important in the extension of supply credit to orchardists in the area. After the apples have been packed in the fall, cold storage companies become the chief single source of credit. Loans by the production credit associations have been

made only to a very limited extent. The financial condition of many orchardists has become serious, through several years of low incomes and through restriction of their usual sources of credit. It is suggested that the credit facilities of the Illinois Fruit Growers Production Credit Association, located at Centralia, or of the general production credit associations at Pittsfield, Jacksonville, and Carlinville, could be used more extensively with distinct advantage to farmers.

The chief items of cash cost in orcharding are spray materials, fertilizers, baskets, and on the larger farms labor. Two cooperative agencies are quite important sources of supplies, but most supplies are purchased from manufacturers or private dealers.

It would be desirable for growers to give close attention to the lowering of production costs. Some concrete suggestions, in addition to the more extended use of recommended orcharding practices, are:

(1) Greater development and use of facilities for low-cost cooperative credit, and (2) cooperative purchasing of farm supplies, aiming at standardized and improved quality as well as at savings in price.

Means of reducing marketing costs should be carefully studied. Specific suggestions along this line are: (1) Continue road improvement program to reduce local transportation costs, (2) use low-cost methods to prepare low-value fruits for market, and (3) increase volume and improve layout of certain packing sheds so as to reduce unit costs.

U.S. Farm credit administration.

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